# CSAI 2020

## The 4th International Conference on Computer Science and Artificial Intelligence

## 第四届计算机科学与人工智能国际会议

# ICIMT 2020

## The 12th International Conference on Information and Multimedia Technology

## 第十二届信息与多媒体技术国际会议

**December 11-13, 2020 | Zhuhai, China**
**12月11-13日 | 中国, 珠海**

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ICPS
Published by ACM

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# Content 目录

# Welcome 欢迎辞

CSAI
ICIMT
Zhuhai, China
11-13, December
2020

Dear distinguished delegates,

We are pleased to welcome you to the 4th International Conference on Computer Science and Artificial Intelligence (CSAI 2020) and its workshop 12th International Conference on Information and Multimedia Technology (ICIMT 2020). Due to the severe impact of COVID-19, we have to hold the conferences online, which can not only make a smooth communication and conference holding, but also can protect everyone away from the virus.

The objective of the conference is to bring together interested academics and industry experts in the field of Computer Science and Artificial Intelligence, Information and Multimedia Technology. The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in their field. As a result of their hard work, we are pleased to have accepted 46 presentations from 89 submissions. The presentations are divided into 5 parallel sessions with topics Software and Data Engineering, Computer Vision and Image Processing, Image and Signal Processing, Computer Science and Applied Technology, Computer and Electronic Engineering.

We'd like to express sincere gratitude to everyone who has contributed to this conference. A word of special welcome is given to our speakers who are pleased to share their new research ideas with us. They are Prof. Benjamin W. Wah, The Chinese University of Hong Kong, Prof. Xiaodong LI, RMIT University, Melbourne, Australia, Prof. Dacheng Tao, The University of Sydney, Australia, Prof. Eric Jiang, University of San Diego, USA, Prof. Hesheng Wang, Shanghai Jiao Tong University, China. Additionally, our special thanks go to our Advisory Chair, Conference Chairs, and Technical Program Chairs, Steering Committee and Technical Committee for their excellent work in securing a substantial input of papers from all around the world and in encouraging participation.

We believe that by this conference, you can get more opportunity for further communication with practitioners with the common interest in this field. We are dedicated to higher and better international conference experiences. We will sincerely listen to any suggestion and comment. Wish you will enjoy this conference, contribute effectively toward it and take back with your knowledge, experiences, contacts and happy memories of these days.

Stay safe and be healthy! We look forward to meeting you again next time!

Yours sincerely,

Conference Chairs

Prof. Xiangqun Chen, Peking University, China

Prof. Ying Tan, Peking University, China

**Advisory Chair 名誉主席**

Prof. Benjamin W. Wah, The Chinese University of Hong Kong (AAAS Fellow, IEEE Fellow, ACM Fellow)

Benjamin W. Wah教授，香港中文大学，美国科学促进会院士，IEEE院士，ACM院士

**Conference Chair 大会主席**

Prof. Ying Tan, Peking University, China

谭营教授，北京大学

**Conference Co-Chair 大会联席主席**

Prof. Xiangqun Chen, Peking University, China; Executive director of Beijing Computer Federation, China

陈向群教授，北京大学，北京计算机学会理事长

**Technical Program Chairs 程序委员会主席**

Prof. Eric Jiang, University of San Diego, USA

Eric Jiang教授，美国圣地亚哥大学

Prof. Hesheng Wang, Shanghai Jiao Tong University, China (IEEE Senior Member)

王贺升教授，上海交通大学，IEEE 高级会员

**Steering Committee 指导委员会**

Prof. Girija Chetty, University of Canberra, Australia (IEEE Senior Member)

Girija Chetty教授，澳大利亚堪培拉大学，IEEE 高级会员

Dr. Hadi Sutopo, Kalbis Institute, Indonesia (IEEE Senior Member)

Hadi Sutopo 博士，印度尼西亚 Kalbis 研究所，IEEE 高级会员

# Guideline 报告指南(英)

## Before the conference

### ✦ Time Zone
Beijing, China (GMT+8)
You're suggested to set up the time on your computer in advance.

### ✦ Platform: ZOOM
Download
1. https://zoom.com.cn/download (Chinese authors' option)
2. https://zoom.us/download

Zoom Guideline: http://csai.org/zoom/

### ✦ Equipment Needed
- A computer with internet connection and camera
- Headphones

### ✦ Environment Needed
- A quiet place
- Stable internet connection
- Proper lighting and background

### ✦ Test Your Presentation
Date: Friday, 11 Dec, 2020
Prior to the formal meeting, presenters shall join the test room to ensure everything is on the right track. Please check your test time on this program.

Every presenter or listener enter the ZOOM, please rename as **SESSION NUMBER+PAPER ID+YOUR NAME.** For example:
Presenters: **S1+ ZH1-001+Tom**
Listeners: **L001+Tom**

If you have any question during the conference,you could add the Wechat, our staff will help to solve the questions. We will also create the Wechat group for CSAI2020, any new information will be updated in the group.

## During the conference

### ✦ Voice Control Rules
- The host will mute all participants while entering the meeting.
- Speakers can unmute microphone when it is turn for his or her presentation.
- Q&A goes after each speaker, the participant can raise questions.

### ✦ Oral Presentation
- Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.
- Please join the meeting room 10 minutes in advance.
- CSAI encourages all presenters to make live oral presentations. For technical problems such as network instability, we suggest you email a record video/slide to conference secretary as backup before/on **8 Dec. 2020**.

### ✦ Conference Recording
- The whole conference will be recorded. We appreciate you proper behavior and appearance.
- The recording will be used for conference program and paper publication requirements. The video recording will be destroyed after the conference and it cannot be distributed to or shared with anyone else, and it shall not be used for commercial nor illegal purpose. It will only be recorded by the staff and presenters have no rights to record.

# Guideline 报告指南(中)

## 会前准备

✦ **时区: 整个会议安排基于北京时间（东 8 区）**

✦ **参加线上会议平台：ZOOM**
**Zoom 电脑客户端下载地址：**
1. https://zoom.com.cn/download
  （中国作者请用此链接下载）
2. https://zoom.us/download
Zoom 中文操作手册
http://csai.org/Zoom-manual-CN.pdf

✦ **请准备一台摄像头麦克风正常运作的电脑以及一副耳机。**

✦ **请选择一个安静的环境，并保证其网络连接稳定，有适当的灯光和背景。请使用会务组提前发送的会议背景图作为参会背景。**

✦ **报告测试环节**
**日期:2020 年 12 月 11 日（星期五）**
将进行 ZOOM 测试以及会议流程介绍，熟悉基本功能：重命名，聊天，举手和共享屏幕，请查阅此日程具体时间安排并准时加入会议室。
与会者加入会议室时，请命名为 **Session number + Paper ID +姓名**，例如:
报告人：**S1+ ZH1-001+Tom**
听众：**L001+Tom**

问答：如果您在操作上或者其他问题可以添加微信，我们将建立 CSAI2020 会议微信群，任何最新消息将在群里进行通知。

扫描微信二维码分配会议管家获取快速回复
咨询时请提供 CSAI2020+文章 ID

## 会议期间

✦ **声音控制规则**
• 在进入会议时，主持人将静音所有与会者。
• 当发言者发言时，可自行解除其麦克风的静音。

✦ **报告流程**
• 请在您的 session 开始前 10 分钟加入会议室。
• 作者报告时间为 15 分钟（包括 2-3 分钟的问答环节）。
• 每个演讲之后都有问答环节，参与者可以进行提问。

✦ **CSAI 鼓励所有演讲者进行现场演讲。以防网络不稳定等技术问题，我们建议您提前录制视频/PPT，并于 12 月 8 日前发送给会议秘书作为备用。**

✦ **根据出版社要求，作者参会报告环节为文章发表前提，请相关作者重视并做好相应报告准备，积极在大会专家报告和平行 session 进行交流。**

✦ **会议录制版权说明**
• 整个会议过程将被录制。请注意外表得体，举止恰当。
• 会议全程只有工作人员有权录制。录制视频将用于会议程序和论文出版相关需求。未经作者允许，不得分发给他人共享，不得用于商业或非法目的。

# Agenda Overview | 日程概览

\* All schedules will process in **Beijing local time (GMT+8)**

\*日程时间安排均为**北京时间**。

| Day 1- Friday, 11 Dec. \| 2020 年 12 月 11 日 （星期五） | | |
|---|---|---|
| 10:30-17:45 | Committee & Speakers' Test Session<br>测试环节 –组委会老师&主旨/特邀报告嘉宾 | Zoom ID: 624 2622 1977<br>Zoom Link: https://zoom.com.cn/j/62426221977 |
| 14:30-16:50 | Authors' Test Session<br>作者测试 | Zoom ID: 615 2793 1301<br>Zoom Link: https://zoom.com.cn/j/61527931301 |

| Day 2- Saturday, 12 Dec. \| 2020 年 12 月 12 日 （星期六） | | |
|---|---|---|
| 09:00-14:00 | Opening & Keynote / Invited Speeches<br>开幕式和嘉宾报告 | Zoom ID: 624 2622 1977<br>Zoom Link: https://zoom.com.cn/j/62426221977 |
| 15:00-17:00 | Session 1 – Software and Data Engineering<br>作者正式报告 1 — 软件与数据工程 | |

| Day 3- Sunday, 13 Dec. \| 2020 年 12 月 13 日 （星期日） | | |
|---|---|---|
| 10:00-12:15 | Session 2 – Computer Vision and Image Processing<br>作者正式报告 2 — 计算机视觉与图像处理 | Zoom ID: 621 9203 5016<br>Zoom Link: https://zoom.com.cn/j/62192035016 |
| 10:00-12:15 | Session 3 – Image and Signal Processing<br>作者正式报告 3 — 图像与信号处理 | Zoom ID: 647 3202 1668<br>Zoom Link: https://zoom.com.cn/j/64732021668 |
| 14:00-16:30 | Session 4 – Computer Science and Applied Technology<br>作者正式报告 4 — 计算机科学及应用技术 | Zoom ID: 621 9203 5016<br>Zoom Link: https://zoom.com.cn/j/62192035016 |
| 14:00-16:30 | Session 5 – Computer and Electronic Engineering<br>作者正式报告 5 — 计算机与电子工程 | Zoom ID: 647 3202 1668<br>Zoom Link: https://zoom.com.cn/j/64732021668 |

# Detailed Overview | 日程详情

CSAI
ICIMT

Zhuhai, China
11-13, December
2020

\* All schedules will process in **Beijing local time (GMT+8)**

\*日程时间安排均为**北京时间**。

## Day 1 - **Friday, 11 Dec. | 2020 年 12 月 11 日（星期五）**

### Committee & Speakers' Test Session  测试环节 –组委会老师&主旨/特邀报告嘉宾
Zoom ID:  624 2622 1977
Zoom Link:  https://zoom.com.cn/j/62426221977

| Beijing Time | Presenter's Local Time | Presenters |
|---|---|---|
| 10:30-10:45 | 10:30-10:45 | Prof. Xiangqun Chen |
| 10:45-11:00 | 10:45-11:00 | Prof. Ying Tan |
| 11:00-11:15 | 11:00-11:15 | Dr. Hadi Sutopo |
| 11:15-11:30 | 11:15-11:30 | Prof. Benjamin W. Wah |
| 11:30-11:45 | 13:30-13:45 | Prof. Xiaodong LI |
| 11:45-12:00 | 19:45-20:00 | Prof. Eric Jiang |
| 12:00-12:15 | 12:00-12:15 | Prof. Hesheng Wang |
| 12:15-12:30 | 14:15-14:30 | Prof. Dacheng Tao |
| 14:30-14:45 | 14:30-14:45 | Assoc. Prof. Shyamala C. Doraisamy |
| 14:45-15:00 | 19:45-20:00 | Lecturer Diab Abuaiadah |
| 15:00-15:15 | 15:00-15:15 | Assoc. Prof. Yan Liu |
| 15:15-15:30 | 15:15-15:30 | Dr. Lam Meng Chun |
| 17:30-17:45 | 09:30-09:45 | Prof. Shigang Yue |

### Authors' Test Session - 作者测试 环节
Zoom ID: 615 2793 1301
Zoom Link: https://zoom.com.cn/j/61527931301

| Test Session Time | Presenters |
|---|---|
| 14:30-14:50 | S1<br>ZH2-308, ZH1-836, ZH2-309, ZH1-824, ZH1-829, ZH1-822, ZH1-846, ZH2-301 |
| 15:00-15:20 | S2<br>ZH1-802, ZH1-803, ZH1-809, ZH1-817, ZH1-823, ZH1-831, ZH1-844, ZH1-861, ZH1-858 |
| 15:30-15:50 | S3<br>ZH1-805, ZH1-850, ZH2-305, ZH1-820, ZH1-838, ZH1-845, ZH2-307, ZH1-859, ZH1-860 |
| 16:00-16:20 | S4<br>ZH2-310, ZH1-815, ZH1-828, ZH1-902, ZH1-848, ZH1-857, ZH1-842, ZH1-843, ZH1-851, ZH1-852 |
| 16:30-16:50 | S5<br>ZH1-807, ZH1-826, ZH1-903, ZH1-830, ZH2-302, ZH1-819, ZH1-854, ZH1-827, ZH1-839, ZH1-816 |

# Detailed Overview | 日程详情

CSAI
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11-13, December
2020

\* All schedules will process in **Beijing local time (GMT+8)**

\*日程时间安排均为**北京时间**。

# Day 2 - Saturday, 12 Dec. | 2020 年 12 月 12 日（星期六）

| **Opening & Keynote Speeches** 正式报告 –开幕式和主旨报告 <br> **Chaired by Prof. Ying Tan, Peking University, China** 主持：谭营教授，北京大学 <br> **Zoom ID: 624 2622 1977** <br> **Zoom Link: https://zoom.com.cn/j/62426221977** | | |
|---|---|---|
| **Beijing Time** | **Presenter's Local Time** | **Presenters** |
| Opening Remarks 开幕式 09:00-09:20 | 09:00-09:20 | Prof. Xiangqun Chen, Peking University, China <br> Executive director of Beijing Computer Federation, China <br> 陈向群教授，北京大学，北京计算机学会理事长 |
| | | Prof. Ying Tan, Peking University, China <br> 谭营教授，北京大学 |
| Keynote Speech I 主旨报告一 09:20-10:00 | 09:20-10:00 | Prof. Benjamin W. Wah, The Chinese University of Hong Kong <br> (AAAS Fellow, IEEE Fellow, ACM Fellow) <br> Benjamin W. Wah 教授，香港中文大学，美国科学促进会院士，IEEE 院士，ACM 院士 |
| | | Speech Title: The Era of Big Applications, Big Data, Big AR, Big Algorithms, and Big Systems: Where Do We Go From Here? |
| Keynote Speech II 主旨报告二 10:00-10:40 | 12:00-12:40 | Prof. Xiaodong LI, RMIT University, Melbourne, Australia <br> Xiaodong LI 教授，澳大利亚墨尔本皇家理工大学 |
| | | Speech Title: Seeking Multiple Solutions: Multi-modal Optimisation Using Niching Methods |
| 10:40-11:00 | | ☕ Break |
| Keynote Speech III 主旨报告三 11:00-11:40 | 13:00-13:40 | Prof. Dacheng Tao, The University of Sydney, Australia <br> Dacheng Tao 教授，澳大利亚悉尼大学 |
| | | Speech Title: Towards Trustworthy Deep Learning |
| 11:40-13:00 | | ☕ Break |

## Invited Speeches
## 正式报告 – 特邀报告

**Chaired by Dr. Hadi Sutopo, Kalbis Institute, Indonesia**
**主持：Hadi Sutopo 博士，印度尼西亚 Kalbis 研究所**

**Zoom ID: 624 2622 1977**
**Zoom Link: https://zoom.com.cn/j/62426221977**

| | | |
|---|---|---|
| Invited Speech I<br>特邀报告一<br>13:00-13:30 | 21:00-21:30 | Prof. Eric Jiang, University of San Diego, USA<br>Eric Jiang 教授，美国圣地亚哥大学 |
| | | Speech Title: Information Filtering Based on Semantic Content |
| Invited Speech II<br>特邀报告二<br>13:30-14:00 | 13:30-14:00 | Prof. Hesheng Wang, Shanghai Jiao Tong University, China<br>(IEEE Senior Member)<br>王贺升教授，上海交通大学，IEEE 高级会员 |
| | | Speech Title - Robot Visual Servoing |

## Session 1 – Software and Data Engineering
## 作者正式报告 1 — 软件与数据工程
**Zoom ID: 624 2622 1977**
**Zoom Link: https://zoom.com.cn/j/62426221977**

| Beijing Time | Presenters |
|---|---|
| 15:00-15:15 | ZH2-308 |
| 15:15-15:30 | ZH1-836 |
| 15:30-15:45 | ZH2-309 |
| 15:45-16:00 | ZH1-824 |
| 16:00-16:15 | ZH1-829 |
| 16:15-16:30 | ZH1-822 |
| 16:30-16:45 | ZH1-846 |
| 16:45-17:00 | ZH2-301 |

# Detailed Overview | 日程详情

CSAI
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\*日程时间安排均为**北京时间**。

# Day 3 - Sunday, 13 Dec. | 2020 年 12 月 13 日（星期日）

**Session 2 – Computer Vision and Image Processing**
作者正式报告 2 — 计算机视觉与图像处理
Zoom ID: 621 9203 5016
Zoom Link: https://zoom.com.cn/j/62192035016

| Beijing Time | Presenters |
|---|---|
| 10:00-10:15 | ZH1-802 |
| 10:15-10:30 | ZH1-803 |
| 10:30-10:45 | ZH1-809 |
| 10:45-11:00 | ZH1-817 |
| 11:00-11:15 | ZH1-823 |
| 11:15-11:30 | ZH1-831 |
| 11:30-11:45 | ZH1-844 |
| 11:45-12:00 | ZH1-861 |
| 12:00-12:15 | ZH1-858 |

**Session 3 – Image and Signal Processing**
作者正式报告 3 — 图像与信号处理
Zoom ID: 647 3202 1668
Zoom Link: https://zoom.com.cn/j/64732021668

| Beijing Time | Presenters |
|---|---|
| 10:00-10:15 | ZH1-805 |
| 10:15-10:30 | ZH1-850 |
| 10:30-10:45 | ZH2-305 |
| 10:45-11:00 | ZH1-820 |
| 11:00-11:15 | ZH1-838 |
| 11:15-11:30 | ZH1-845 |
| 11:30-11:45 | ZH2-307 |
| 11:45-12:00 | ZH1-859 |
| 12:00-12:15 | ZH1-860 |

**Session 4 – Computer Science and Applied Technology**
作者正式报告 4 — 计算机科学及应用技术
Zoom ID: 621 9203 5016
Zoom Link: https://zoom.com.cn/j/62192035016

| Beijing Time | Presenters |
|---|---|
| 14:00-14:15 | ZH2-310 |
| 14:15-14:30 | ZH1-815 |
| 14:30-14:45 | ZH1-828 |
| 14:45-15:00 | ZH1-902 |
| 15:00-15:15 | ZH1-848 |
| 15:15-15:30 | ZH1-857 |
| 15:30-15:45 | ZH1-842 |
| 15:45-16:00 | ZH1-843 |
| 16:00-16:15 | ZH1-851 |
| 16:15-16:30 | ZH1-852 |

**Session 5 – Computer and Electronic Engineering**
作者正式报告 5 — 计算机与电子工程
Zoom ID: 647 3202 1668
Zoom Link: https://zoom.com.cn/j/64732021668

| Beijing Time | Presenters |
|---|---|
| 14:00-14:15 | ZH1-807 |
| 14:15-14:30 | ZH1-826 |
| 14:30-14:45 | ZH1-903 |
| 14:45-15:00 | ZH1-830 |
| 15:00-15:15 | ZH2-302 |
| 15:15-15:30 | ZH1-819 |
| 15:30-15:45 | ZH1-854 |
| 15:45-16:00 | ZH1-827 |
| 16:00-16:15 | ZH1-839 |
| 16:15-16:30 | ZH1-816 |

# Speakers | 报告嘉宾

CSAI
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Zhuhai, China
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2020

**Prof. Benjamin W. Wah**
**The Chinese University of Hong Kong**
**(AAAS Fellow, IEEE Fellow, ACM Fellow)**
**Benjamin W. Wah 教授，香港中文大学**

**美国科学促进会院士，IEEE 院士，ACM 院士**

Keynote Speech I
主旨报告一
Zoom ID: 624 2622 1977
09:20-10:00, 12 Dec (GMT+8)

**Speech Title:** The Era of Big Applications, Big Data, Big AR, Big Algorithms, and Big Systems: Where Do We Go From Here?

**Abstract:** This presentation examines issues facing the new era of multi-disciplinary applications, intelligent systems, complex algorithms, big data, and substantial computer infrastructures. Traditional approaches that focus on an individual aspect of a problem are inadequate for designing these challenging applications. A successful strategy must involve an integrated approach that examines tradeoffs among competing objectives and resource constraints with sound domain knowledge. We propose methods for tackling these complex applications from the evolution of computer systems, artificial intelligence, big data, and complexity theory. Lastly, we offer a new paradigm for harnessing the complexity of designing intelligent systems in this new era.

**Bio:** Professor Wah was born in Hong Kong and graduated from Queen Elizabeth School, Hong Kong. He received his BS and MS in Electrical Engineering and Computer Science from Columbia University, USA, then furthered his studies at the University of California, Berkeley, obtaining an MS in Computer Science and a PhD in Databases.

In 1985-2011, he was the Franklin W. Woeltge Endowed Professor of Electrical and Computer Engineering at the University of Illinois, Urbana-Champaign, USA. In 2008-2009, he also served as Director of the Advanced Digital Sciences Center in Singapore, a US$50 million research center established by the University of Illinois in Singapore in collaboration with the Singapore government's Agency for Science, Technology and Research. In 1998-1999, Wah was Chair Professor of Computer Science and Engineering at The Chinese University of Hong Kong (CUHK), and in that year received an Exemplary Teaching Award. From 1999 to 2003, he served as Adjunct Professor in the Department of Computer Science and Engineering at CUHK. Between 2009-2019, he served as Provost of the Chinese University of Hong Kong.

He has published numerous research articles in top professional journals, such as Artificial Intelligence, IEEE Trans. in Computers, IEEE Trans. on Knowledge and Data Engineering, IEEE Trans. on Multimedia, IEEE Trans. on Parallel and Distributed Technology, IEEE Trans. on Software Engineering, Journal of Global Optimization, Journal of Artificial Intelligence Research.

Professor Wah was elected President of IEEE Computer Society in 2001. He was a member of the Research Grants Council of Hong Kong between 2005 and 2009 and Chairman of its Engineering Panel between 2006 and 2009. He has been a member of the HK Research Grants Council since 2011. He has received numerous honors and awards for his distinguished academic and professional achievements. He has been elected: Fellow of the American Association for the Advancement of Science, Fellow of IEEE, Fellow of the Association for Computing Machinery.

# Speakers | 报告嘉宾

CSAI
ICMT

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2020

**Prof. Xiaodong LI**
**RMIT University, Melbourne, Australia**
**Xiaodong LI 教授，澳大利亚墨尔本皇家理工大学**

**Bio:** Xiaodong Li (M'03-SM'07-Fellow'20) received his B.Sc. degree from Xidian University, Xi'an, China, and Ph.D. degree in information science from University of Otago, Dunedin, New Zealand, respectively. He is a Professor with the School of Science (Computer Science and Software Engineering), RMIT University, Melbourne, Australia. His research interests include machine learning, evolutionary computation, neural networks, data analytics, multiobjective optimization, multimodal optimization, and swarm intelligence. He serves as an Associate Editor of the IEEE Transactions on Evolutionary Computation, Swarm Intelligence (Springer), and International Journal of Swarm Intelligence Research. He is a founding member of IEEE CIS Task Force on Swarm Intelligence, a vice-chair of IEEE Task Force on Multi-modal Optimization, and a former chair of IEEE CIS Task Force on Large Scale Global Optimization. He is the recipient of 2013 ACM SIGEVO Impact Award and 2017 IEEE CIS "IEEE Transactions on Evolutionary Computation Outstanding Paper Award". He is an IEEE Fellow.

Keynote Speech II
主旨报告二
Zoom ID: 624 2622 1977
10:00-10:40, 12 Dec (GMT+8)

**Speech Title:** Seeking Multiple Solutions: Multi-modal Optimisation Using Niching Methods

**Abstract:** Population or single solution search-based optimization algorithms (i.e., meta-heuristics) in their original forms are usually designed for locating a single global solution. Representative examples include among others evolutionary and swarm intelligence algorithms. These search algorithms typically converge to a single solution because of the global selection scheme used. Nevertheless, many real-world problems are "multi-modal" by nature, i.e., multiple satisfactory solutions exist. It may be desirable to locate many such satisfactory solutions, or even all of them, so that a decision maker can choose one that is most proper in his/her problem context. Numerous techniques have been developed in the past for locating multiple optima (global and/or local). These techniques are commonly referred to as "niching" methods, e.g., crowding, fitness sharing, derating, restricted tournament selection, clearing, speciation, etc. In more recent times, niching methods have also been developed for meta-heuristic algorithms such as Particle Swarm Optimization (PSO) and Differential Evolution (DE). In this talk I will introduce niching methods, including its historical background, the motivation of employing niching in EAs, and the challenges in applying it to solving real-world problems. I will also describe a niching competition series run annually by the IEEE CIS Taskforce on Multimodal Optimization. Niching methods can be applied for effective handling of a wide range of problems including static and dynamic optimization, multiobjective optimization, clustering, feature selection, and machine learning. I will provide several such examples of solving real-world multimodal optimization problems.

# Speakers | 报告嘉宾

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**Keynote Speech III**
主旨报告三
Zoom ID: 624 2622 1977
10:50-11:30, 12 Dec (GMT+8)

**Prof. Dacheng Tao**
**The University of Sydney, Australia**
**BEng (USTC)| MPhil (CUHK) |PhD (London)**
**IEEE Fellow, ACM Fellow, AAAS Fellow**

Dacheng Tao 教授，澳大利亚悉尼大学

IEEE 院士，ACM 院士，美国科学促进会院士

**Speech Title:** Towards Trustworthy Deep Learning

**Abstract:** We are fortunate on the edge to embrace the revolutionary progress of Artificial Intelligence (AI) and to witness the enthusiasm of translational AI deployments sweeping across all sectors in our life and work. The almost simultaneous rise of transformational deep learning, big data, and powerful computational machines since 2010 is progressively enabling AI systems to perceive, learn, reason, and behave like a human, and makes the next generation of AI systems distinct from those developed in the past. Thus, it is critical to better understand why deep learning is capable and has the capacity to raise the third wave of AI. In this talk, we will present our investigations, initiatives, and insights to the interpretation of the successful deep learning.

**Bio:** Dacheng Tao is Professor of Computer Science and ARC Laureate Fellow in the School of Computer Science and the Faculty of Engineering, and the Inaugural Director of the UBTECH Sydney Artificial Intelligence Centre, at The University of Sydney. His research results in artificial intelligence have expounded in one monograph and 200+ publications at prestigious journals and prominent conferences, such as IEEE TPAMI, TIP, TNNLS, TCYB, TEC, IJCV, JMLR, AIJ, AAAI, IJCAI, NeurIPS, ICML, CVPR, ICCV, ECCV, ICDM, and KDD, with several best paper awards. He received the 2018 IEEE ICDM Research Contributions Award and the 2015 Australian Museum Scopus-Eureka prize. He is a Fellow of the IEEE, AAAS, ACM and Australian Academy of Science.

# Speakers | 报告嘉宾

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### Prof. Eric Jiang
### University of San Diego, USA
### Eric Jiang 教授，美国圣地亚哥大学

**Invited Speech I**
特邀报告一
Zoom ID: 624 2622 1977
13:00-13:30, 12 Dec (GMT+8)

**Bio:** Eric Jiang is currently a full professor of computer science at University of San Diego, USA. He also served as head of mathematics and computer science of University of San Diego from 2014 to 2016. His research interests include information retrieval, data analytics and machine learning and parallel and distributed computing. Professor Jiang has published research papers in journals and edited books. He has also given presentations at international conferences, workshops and technology research centers. He has been serving on the editorial board of International Journal of Intelligent Data Analysis and as a member of review boards of several journals. In addition, he has served on organizing committees for numerous international conferences on text mining, machine learning, intelligent modeling and applications.

**Speech Title:** Information Filtering Based on Semantic Content

**Abstract:** Information filtering is the process of selecting and delivering the information relevant to an individual's information needs. It aims to provide users with tools to manage the information overload and to increase the semantic signal-to-noise ratio and has been applied in many diverse domains that range from Internet searches, personalized news feeds to e-commerce promotions and recommendations. In this talk, we offer an overview of information filtering and related fields as well as their applications. We also discuss a conceptual information filtering approach that extracts semantic content of a body of text that reflects associations between the terms that occur in other similar contexts. By circumventing the problems of traditional lexical matching techniques, the approach is capable of selectively weeding out irrelevant information and improving filtering performance.

# Speakers | 报告嘉宾

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**Prof. Hesheng Wang**
**Shanghai Jiao Tong University, China**
**(IEEE Senior Member)**
**王贺升教授，上海交通大学，IEEE 高级会员**

**Bio:** Hesheng Wang received the Ph.D. degree in Automation & Computer-Aided Engineering from the Chinese University of Hong Kong. Currently, he is a Professor of Department of Automation, Shanghai Jiao Tong University, China. He has published more than 100 papers in refereed journals and conferences. He is an associate editor of Assembly Automation and International Journal of Humanoid Robotics, a Technical Editor of IEEE/ASME Transactions on Mechatronics. He served as an associate editor for IEEE Transactions on Robotics from 2015 to 2019. He was the general chair of IEEE RCAR2016 and program chair of IEEE AIM2019 and IEEE ROBIO2014. He was a recipient of Shanghai Rising Star Award in 2014, The National Science Fund for Outstanding Young Scholars in 2017 and Shanghai Shuguang Scholar in 2019. He is a Senior Member of IEEE.

Invited Speech II
特邀报告二
Zoom ID: 624 2622 1977
13:30-14:00, 12 Dec (GMT+8)

**Speech Title:** Robot Visual Servoing

**Abstract:** Visual servoing is an important technique that uses visual information for the feedback control of robots. By directly incorporating visual feedback in the dynamic control loop, it is possible to enhance the system stability and the control performance. Many challenges appear when robots come to our daily life. Compare to industrial applications, the robot need deal with many unexpected situations in unstructured environments. The system should estimate the depth information, the target information and many other information online. In this talk, various visual servoing approaches will be presented to work in unstructured environments. These methods are also implemented in many robot systems such as manipulator, mobile robot, soft robot, quadrotor and so on.

**Saturday, 12 Dec. - 2020 年 12 月 12 日（星期六）**

**15:00-17:15, GMT+8**

## Session 1

## Software and Data Engineering

## 软件与数据工程

**Zoom ID: 624 2622 1977**

**Zoom Link: https://zoom.com.cn/j/62426221977**

**Chaired by**

**Chaired by Assoc. Prof. Shyamala C. Doraisamy, Universiti Putra Malaysia, Malaysia**

**分会主席：Shyamala C. Doraisamy，副教授，马来西亚博特拉大学**

**8 Presentations—**

**ZH2-308, ZH1-836, ZH2-309, ZH1-824, ZH1-829, ZH1-822, ZH1-846, ZH2-301**

Note:

* Please arrive at the conference rooms 5-10 minutes before the session start.

* Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.

* Certificate of Presentation will be sent to each presenter's email box after the conference.

* One Best Presentation will be selected from each parallel session and the author of best presentation will be announced at the end of this session.

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| **ZH2-308**<br>15:00-15:15 | Research on Test Method of C2 System's VMF interoperation function<br>**Xuan Wang**, Zhiqiang Shi and Liya Jin<br>PLA Army Academy of Armored Forces, China<br><br>Abstract - This paper analyses the test content of C2(Command and Control) System's VMF (Variable Message Format) interoperation function, and proposes the test method for VMF standard consistency, VMF interoperation function, VMF-FMF(Fixed Message Format) interoperation function, VMF-HLA(High Level Architecture) interoperation function. The core of the test method of C2 System's VMF interoperation function is the VMF test case generation, this paper analyses the test requirements considering both the syntactic rules and semantic rules, designs the categories of test cases that can be generated from VMF data element dictionary, and provides the test case generation method which can easily adapt to the up-to-date information of the VMF Standard. |
| **ZH1-836**<br>15:15-15:30 | Understand Online Medical Consultation Based on Dialogue State Tracking<br>**Beiyu Xu** and Wei Ren<br>University of Liverpool, UK<br><br>*Abstract* - With the continuous development of online clinical inquiry system, Chinese medical online inquiry community emerges actively. One of the core task of medical inquiry system is to extract the medical information from dialogue with specific significance for treatment including self-reported diseases, treatment means, doctor's advices and other kind of useful entities. However, due to the specific difficulties, such as colloquialism in dialogue text, it is still difficult to extract key medical information exactly. To alleviate this issue, this paper proposes a new neural network based method of information extraction for medical online consultation system with a coarse-granularity data annotation approach, which is more time-saving and robust compared with the traditional sequence labelling methods. Experimental results prove the effectiveness of our method. |
| **ZH2-309**<br>15:30-15:45 | Research on Architecture of Big Date Analysis Platform in Cloud Environment<br>**Liya Jin**, Ronghui Wang and Xuan Wang<br>Army Armored Forces, China<br><br>*Abstract* - The rapid development of big data has attracted extensive attention at home and abroad. Scientific and effective analysis and processing of big data is the core issue in the field of big data. The construction of a big data analysis platform in cloud environment can process complex data structures and highly correlated data, timely respond to user requests, realize intelligent and efficient data analysis, and mine more valuable data, providing technical support for the rapid construction of big data services. |
| **ZH1-824**<br>15:45-16:00 | A Hybrid Model for Mechanical Paper Summarization Based on COVID-19 Open Research Dataset<br>**Guohui Song** and Yongbing Wang<br>Communication University of China, China<br><br>*Abstract* - Automatic generation of summarization or keyphrase have been applied in a variety of domains,such as scientific papers and news. In response to the COVID-19 pandemic, the white house and some research groups have prepared the COVID-19 article dataset. To struggle against the COVID-19 the automatic summarization or keyphrase method can be useful for those wanting a quick overview of what the latest information is saying on pandemic topics. In this paper, we introduce the COVID-19 dataset from Kaggle. Then, we propose a novel model which combine a conventional |

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| | Seq2Seq model with attention mechanism and a classical keywords extraction method. Our motivation is to obtain key information and maintain the result coherence. Experiment results reveal that our model depending on the COVID-19 dataset achieves a considerable improvement over a classical Seq2Seq model with attention mechanism. |
| **ZH1-829**<br>16:00-16:15 | Attentive Goal-based Dialogue System for ADHD Behavior Treatment<br>**Liguo Zhang** and Rize Jin<br>Tiangong University, China<br><br>*Abstract* - Attentive deficit and hyperactivity disorder (ADHD) is one of the most common behavior disorders in children. The treatment methods of ADHD mainly include drug therapy, psychobehavioral therapy, family therapy, Electroencephalogram (EEG) biofeedback, etc. Family therapy requires parents to understand the behavior disorder and to improve the behavior of children with appropriate methods. Parents can get behavioral training advises by consulting therapists in medical institutions. However, it cannot assure the timeliness of guidance and requires therapists of some amount of repetitive work. Therefore, in this paper, we construct a data set for ADHD behavioral training, which is extracted from real-life dialogues between parents of ADHD children and therapists. Then, a dialogue system is developed for helping parents to deal with ADHD children. It incorporates self-attention mechanism in natural language understanding module to improve the accuracy of semantic analysis. It also adopts deep reinforcement learning in dialogue policy learning module, exploring the effective strategy. Experimental results show that the proposed dialogue system leads to significant improvement on task success rate and reduction in dialogue length comparing to rule-based training model. |
| **ZH1-822**<br>16:15-16:30 | Port Throughput Forecast Model Based on Adam Optimized GRU Neural Network<br>**Xiubin Chen** and Lei Huang<br>Beijing Jiaotong University, China<br><br>*Abstract* - The forecast of port throughput can not only provide a basis for the business plan of the enterprise, but also provide a reference for the construction of transportation facilities in the city where the port is located. Gated Recurrent Unit (GRU), as the latest Long Short-Term Memory (LSTM) variant, solves the complementary redundancy of the original input gate and forget gate. In order to predict data more accurately, this paper proposes a port throughput forecast model based on Adam optimized GRU neural network (Adam-GRU). Combining the effective gradient optimization algorithm Adam with GRU can make the forecasting process more efficient. Taking the throughput data of Guangzhou Port Group G Port Affairs Company as an example, this paper compares the Adam-GRU model with other proven traditional forecasting methods, including Back Propagation (BP) Neural Network, Recurrent Neural Network (RNN) and LSTM. The experimental results show that Adam-GRU performs better under the evaluation of various performance indicators, reflecting clear practicality and innovation. |
| **ZH1-846**<br>16:30-16:45 | Quantitative Associative Classification Based on Kernel Mean Embedding<br>**Zengda Guan** and Juan Zhang<br>Jianzhu University, China<br><br>*Abstract* - Quantitative associative classification (QAC) is favored for its strong explainability and satisfying predictive ability. However, existing QAC methods can't directly classify quantitative dataset basically, instead they work by partitioning quantitative data into a number of categories and classify them, which cause information loss. Here, we propose a new method to estimate the probability of association rules straightforwardly using kernel mean embedding technology without any partitioning. |

# Session 1 | 平行报告一

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| | Specifically, we implement an Apriori-like association rule discovery process and estimate the posterior probability of data by Bayes' rule with the terms being computed in a kernel mean embedding pattern. To verify our method, we take experiments on several data sets, and the results demonstrate the method perform better than SVM, decision tree and partitioning Apriori algorithm. We also test the effect of the method's super-parameters including minimal support, minimal confidence and maximal attribute set size, and give an example of quantitative association rule set. |
| ZH2-301<br>16:45-17:00 | An Online Crowdsourcing Experiment to Model the Effects of a Commercial on a User's Consumption Behavior<br>**Evin Aslan Oguz** and Andrej Kosir<br>University of Ljubljana, Slovenia<br><br>*Abstract -* Measuring multimedia exposure is challenging, since the impact of multimedia-content on a user is dependent on the user, the multimedia-content, the context, previous exposure, etc. We focus on measuring the impact of a commercial on a user's consumption behavior. We aim to understand the relation between a commercial and its effects on a consumer; whether watching a particular commercial affects an individual's consumption behavior regarding the advertised product. This paper covers a segment of the larger study which is building a model for measuring the multimedia exposure of the users caused by a commercial. The goal of this paper is to test the developed instrument via an online crowdsourcing study, and analyze the participation date and time, and the attentiveness of the users. The aim is to evaluate the applicability of crowdsourcing platforms as an alternative to testing real users in the laboratory. We evaluate the psychometric characteristics (validity and reliability) of the developed instrument. The reliability coefficient $\alpha$ shows good reliability and coefficient $\omega$ shows good saturation model. |

# Session 2 | 平行报告二

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**Sunday, 13 Dec. - 2020 年 12 月 13 日（星期日）**

**10:00-12:15, GMT+8**

## Session 2

## Computer Vision and Image Processing

## 计算机视觉与图像处理

**Zoom ID: 621 9203 5016**

**Zoom Link: https://zoom.com.cn/j/62192035016**

**Chaired by**

**Lecturer Diab Abuaiadah, Waikato Institute of Technology, New Zealand**

**Assoc. Prof. Xiaofeng Fu, HangZhou DianZi University, China**

**分会主席：Diab Abuaiadah，讲师，新西兰怀卡托技术学院**

**付晓峰，副教授，中国杭州电子科技大学**

**9 Presentations—**

**ZH1-802, ZH1-803, ZH1-809 , ZH1-817, ZH1-823, ZH1-831, ZH1-844, ZH1-861, ZH1-858**

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| ZH1-802<br>10:00-10:15 | Multi-scale Attention Net for Retina Blood Vessel Segmentation<br>**Yulin Wu**, Anqi Liu, Lei Chen, Dong Zhao, Hongchao Zhou and Qinghe Zheng<br>Shandong University, China<br><br>*Abstract* - U-Net has been recently employed to solve the medical image segmentation problems such as retina blood vessel segmentation. The structure with skip connections in U-Net can effectively concatenate the features of encoding and decoding branches. In this paper, we propose a Multi-scale Attention Net (MA-Net) based on U-Net where the variation of scale inside the paths and relevant regions in feature maps are considered. There are several advantages of the proposed architecture for segmentation tasks. First, multi-scale connections inside encoding and decoding paths can fuse information within and between blocks at the same time and ensure better feature representation. Second, MA-Net integrates attention mechanism to suppress irrelevant regions in feature maps and highlight salient features. Experimental results illustrate that the proposed method outperforms the compared algorithms on segmentation tasks for blood vessel. |
| ZH1-803<br>10:15-10:30 | Image Segmentation based on Geodesic Distance Combined with Region and Edge Gradient<br>**Xiangyang Liu**, Yujie Yong and Xiaofeng Zhang<br>Hohai University, China<br><br>*Abstract* - In this paper, data points are uesd to represent vertices of a graph connected by weighted edges signifying similarity based on distance. The goal of this work is to accurately achieve image segmentation using both edge and region information on the basis of superpixels. In order to combine these clues in an optimal way, we use geodesic distance and formulate features that respond to characteristic changes in brightness, color, texture and gradient associated with adjacent superpixels. To determine whether a superpixel boundary is a segmentation, the edge gradient and the local density are used to overcome some shortcomings of the traditional DP algorithm. Experiments are conducted on Berkeley Segmentation Database and the result of segmented images verify the efficiency of our approach by comparison with other methods. |
| ZH1-809<br>10:30-10:45 | Feature Extraction and Identification of Military Aircraft Based on Remote Sensing Image<br>**Jianhui Liu**, Gangwu Jiang, Xin Wang, Baiqi Xu and Peidong Yu<br>Information Engineering University, China<br><br>*Abstract* -In military application, it is valuable to intelligently acquire target information aided in remote sensing image by computer. Based on the Internet information, a group of five categories of American military aircraft are constructed, and the target detection framework and algorithm of deep learning are carried out, and we made experiments on deep learning method to verify the effectiveness and feasibility of the characteristics extraction and fine particle *size* recognition by using neural network, and provided some references for the evolution of the future war style and the intelligent battle of the future. |
| ZH1-817<br>10:45-11:00 | An Improved Method to Enhance Low Illumination Image Based on Retinex Theory<br>Huijie Fan, **Bo Fu** and Qingxuan Rong<br>Chinese Academy of Sciences, China<br><br>*Abstract* -The computer vision technology is applied more and more extensively. In order to improve the effectiveness of various computer vision algorithms, the enhancement for low-illumination image is *now* playing an important role as image preprocessing. Aiming at the problems of image restoration and adaptive illumination adjustment, we proposed an improved low-illuminance image enhancement method based on convolutional neural network and Retinex theory. We first decompose the low-illuminance image into a reflection component and an illuminance component. Secondly, a convolutional neural network is designed for each of *the* two components. The reflection component branch restores the details of the image, and the illuminance component branch adaptively adjusts the image illuminance. Finally, the image is reconstructed. The experiments result |

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| | show that our method has a better performance in SSIM and PSNR. Moreover, the image noise is well suppressed and the image details are also enhanced visually. |
| ZH1-823<br>11:00-11:15 | Multi-view Face Recognition based on Low-rank Features and Sparse Representation Residual Ratio Comparison<br>Jianbo Zhou, **Xiaofeng Fu**, Xiaojuan Fu and Yu Zhang<br>HangZhou DianZi University, China<br><br>*Abstract -* Concerning the problem that the existing face recognition algorithm fails to exhibit good robustness when dealing with multi-view mixed face data, a multi-view face recognition method based on low-rank features and auxiliary dictionary is proposed. The method is designed to select low-rank decomposition models with two different regular terms and complete the feature extraction process respectively, and reduce the difference of same people faces in different views. The obtained low-rank feature can enhance the discriminating information of different types of faces in the same view, and remove the influence of common parts on the recognition effect. Then, using the external data to learn auxiliary dictionary which can simulate view variable and a residual ratio comparison model based on the minimum residual and the secondary minimum residual is designed. Finally, the final classification results are determined based on the results of auxiliary dictionary learning and residual ratio comparison. Experiments on the multi-view face database CMU-PIE with or without auxiliary dictionary show that the improved method can obtain low-rank face discrimination information and eliminate the gesture interference effectively. The proposed face recognition algorithm has more efficient recognition rate and robustness in the experimental environment of multi-view mixed data. |
| ZH1-831<br>11:15-11:30 | The Detection and Recognition of Pulmonary Nodules Based on U-net and CNN<br>**Guilai Han**, Wei Liu, Benguo Yu, Lu Liu, Xiaoling Li and Haixia Li<br>Hainan Medical College, China<br><br>*Abstract -* In recent years, with the rapid development of deep learning, especially convolutional neural network technology, deep learning technology has been widely used in various image classification and recognition, including the detection and recognition of pulmonary nodules. However, due to the limitation of computer capability, the input image size of convolutional neural network for deep learning is usually fixed, and the image size is usually small. However, the size of CT images used to detect pulmonary nodules is 512×512 and the sample data for training convolutional neural network is relatively small. It is usually *difficult* for ordinary *convolution* neural networks to detect directly. As a special full convolution network, U-net can be used directly for large-scale image detection by replacing the full connection layer with the convolution layer. And U-net is suitable for small sample medical image detection. Therefore, the detection of pulmonary nodules with U-net has been tried in this paper. The detection and recognition of pulmonary nodules is divided into two steps. Firstly, a U-net network is used to detect and segment suspicious pulmonary nodules. Secondly, in order to improve the accuracy of pulmonary nodules detection and recognition, a convolution neural network(CNN) is used to classify and identify the pulmonary nodules segmented by U-net detection, so as to remove the false positive pulmonary nodules. The experimental results show that the pulmonary nodules detection and recognition method combined with U-net and CNN is not only suitable for small sample and large size chest CT image detection, but also can remove a large number of false positive pulmonary nodules, effectively improve the accuracy of pulmonary detection, *which* is of great significance for the classification and recognition of pulmonary nodules using deep learning technology. |
| ZH1-844<br>11:30-11:45 | Ky Fan 2-k-Norm model for Low-Rank Matrix Recovery with ADMM<br>**Yulin Wang**, Yunjie Zhang and Lu Zhang<br>Dalian Maritime University, China<br><br>*Abstract -* In order to recover a low-rank matrix, the nuclear norm minimization problem is generally used to instead of the rank function minimization problem. But it is difficult to satisfy the restricted isometry conditions of linear map. When the rank is large enough, |

# Session 2 | 平行报告二

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| | this convex relaxation can fail to recover the matrix. To solve this problem, a new nonconvex model, Ky Fan 2-k-norm model, is proposed to replace the rank function. Extend the restricted isometry of vectors to the matrices, our model is more stable than the unclear norm model. The ADMM algorithm is used to transform the model into three subproblems, which is widely used in computer vision. To facilitate the update of X, we replace the model with a convex model of form L_1-norm. Then we use the accelerated proximal gradient (APG) algorithm to calculate, and a closed form solution can be found by soft threshold operator. Extensive experiments on both synthetic data and real images demonstrate that the Ky Fan 2-k-norm model has better recovery ability than the nuclear norm model. |
| ZH1-861<br>11:45-12:00 | Breast Ultrasound Image Analysis based on Transfer Learning<br>**Chaoyun Wang** and Hongwei Mo<br>Harbin Engineering University, China<br><br>*Abstract -* Breast cancer is the most common cancer in women, and ultrasound diagnosis is one of the most common diagnostic methods. This paper adopted the transfer learning method to classify benign and malignant breast tumours by ultrasound images and predict molecular subtypes. To study the effect of the transfer learning model on breast cancer diagnosis in the benign and malignant tumour classification, we tested whether different models were transferred learning. After transfer learning, the Xception model reached 87.75% in tumour classification accuracy, superior to other models without transfer learning. In predicting and diagnosing molecular subtypes, the multiple-transfer learning Xception model's recognition accuracy reached 74.3%, and the AUC value reached 0.8801. Compared with the Xception model without transfer learning, the accuracy was improved by 4.02%, and the single-transfer learning Xception model was improved by 3.22%, achieving a relatively excellent classification effect. Our results show that the application of transfer learning can improve breast cancer ultrasound images' diagnostic accuracy. Multiple transfer learning can improve the accuracy of molecular subtypes prediction in a small sample of breast cancer. |
| ZH1-858<br>12:00-12:15 | A Split-Based Algorithm Optimization for AVS3 Intra Coding<br>**Xue Zhang**, Dong Jiang, Zhu Hong, Feiyang Zeng, Jucai Lin and Jun Yin<br>R&D Center Zhejiang Dahua Technology Co.,Ltd, China<br><br>*Abstract -* IntraDT is an intra coding algorithm in AVS3, which is used to further divide the current coding block to obtain multiple sub blocks for prediction. The optimal prediction modes in each sub block are selected adaptively. In this paper, we propose a split-based intra coding algorithm based on the intraDT algorithm of AVS3, which makes the partition of sub blocks match the image texture more accurately. The improvement of the proposed method mainly lies in the addition of vertical and horizontal symmetric binary partition mode, and the specified transform partition modes corresponding to the two prediction partition modes, compared with intraDT. The optional prediction partition modes are extended, and the transform partition modes under the new partition modes are not necessary to be transmitted. The new partition modes can match the image texture more accurately, and find a better balance between the depth of CU partition and the redundancy of prediction block partition. The experimental results show that the proposed method is effective for the test sequences in common test condition in AVS3. The BD-rate for the components of Y, U and V achieve gains of 0.13%, 0.44% and 0.32% under All-Intra configuration, respectively, while achieving gains of 0.12%, 0.02% and 0.26% under Random-Access configuration. |

**Sunday, 13 Dec. - 2020 年 12 月 13 日（星期日）**

**10:00-12:15, GMT+8**

## Session 3

## Image and Signal Processing

## 图像与信号处理

**Zoom ID: 647 3202 1668**

**Zoom Link: https://zoom.com.cn/j/64732021668**

**Chaired by**

**Assoc. Prof. Yan Liu, University of Chinese Academy of Sciences, China**

**分会主席：刘艳，副教授，中国科学院大学**

**9 Presentations—**

**ZH1-805, ZH1-850, ZH2-305, ZH1-820, ZH1-838, ZH1-845, ZH2-307, ZH1-859, ZH1-860**

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| **ZH1-805**<br>10:00-10:15 | A Reward Shaping Method based on Meta-LSTM for Continuous Control of Robot<br>**Jixun Yao**, Xiaoan Li and Dengshan Huang<br>Northwestern Polytechnical University, China<br><br>*Abstract -* In the continuous control of robots based on reinforcement learning, Proximal Policy Optimization (PPO) is a highly popular policy-based reinforcement learning algorithm. However, the PPO algorithm reduces the policy update area prematurely due to the influence of the advantage function on the policy search, which causes the policy search to progress slowly. Drawing inspiration from meta-learning, a reward shaping algorithm based on the Meta-LSTM is proposed. To ensure the stability of the learning reward shaping process, we innovatively added constraints on the importance of actions in Meta-LSTM and through the motivate coefficient to ensure the adaptability of reward to different environments. The experimental results show that the reward based on the Meta-LSTM method is better than the benchmark algorithm in guiding the policy search, and the promotion effect is more evident in the task with higher dimensions. |
| **ZH1-850**<br>10:15-10:30 | Automatic Detection of Epilepsy EEG based on CNN-LSTM Network Combination Model<br>**Xiaohan Liu**, Jian Jia and Rui Zhang<br>Northwest University, China<br><br>*Abstract -* Using EEG to detect epilepsy is a time-consuming and laborious process. The experiments de-signed by most of the existing classification detection technologies tend to have many steps, resulting in high experimental costs. In response to this problem, this paper proposes two deep learning combination models based on CNN-LSTM, which merge the two steps of feature extraction and classification of EEG signals into a single model, that is, through the establishment of parallel and series combined models. Under the premise of any data preprocessing operations, the automatic detection of one-dimensional epilepsy EEG signals is realized. The performance evaluation of the model on the BONN epilepsy dataset shows that for the two-class problem, the average accuracy of the parallel model is 97.2%, and the average accuracy of the series model is 99.2%; for the three-class problem, the average accuracy of the parallel model is up to 88.8%, the average accuracy of the series model is 95.9%. The combined model based on CNN and LSTM can perform experiments without manual extraction of complex features and any data preprocessing, and achieve good performance. |
| **ZH2-305**<br>10:30-10:45 | Acoustic Feature Analysis for Wet and Dry Road Surface Classification Using Two-stream CNN<br>**Siavash Bahrami**, Shyamala Doraisamy, Azreen Azman, Nurul Amelina Nasharuddin and Shigang Yue<br>Universiti Putra Malaysia, Malaysia<br><br>*Abstract -* Road surface wetness affects road safety and is one of the main reasons for weather-related accidents. Study on road surface classification is not only vital for future driverless vehicles but also important to the development of current vehicle active safety systems. In recent years, studies on road surface wetness classification using acoustic signals have been on the rise. Detection of road surface wetness from acoustic signals involve analysis of signal changes over time and frequency-domain caused by interaction of the tyre and the wet road surface to determine the suitable features. In this paper, two single stream CNN architectures have been investigated. The first architecture uses MFCCs and the other uses temporal and spectral features as the input for road surface wetness detection. A two-stream CNN architecture that merges the MFCCs and spectral feature sets by concatenating the outputs of the two streams is proposed for further improving classification performance of road surface wetness detection. Acoustic signals |

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| | of wet and dry road surface conditions were recorded with two microphones instrumented on two different cars in a controlled environment. Experimentation and comparative performance evaluations against single stream architectures and the two-stream architecture were performed. Results shows that the accuracy performance of the proposed two-stream CNN architecture is significantly higher compared to single stream CNN for road surface wetness detection. |
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| ZH1-820 10:45-11:00 | Translating Natural Language Instructions for Behavioral Robot Indoor Navigation with Attention-History Based Attention<br>**Pengpeng Zhou** and Hao He<br>Shanghai Jiao Tong University, China<br><br>*Abstract* - In typical indoor robot navigation scene, it is reasonable to use natural language to navigation due to GPS signal lacking. Translating natural navigation instructions to an executable behavior plan can be implemented by a traditional encoder decoder model with attention mechanism. In traditional attention mechanism, the attention distribution is generated based only on the current decoder state, which may ignore previous useful patterns and introduce translation error. In this work, we propose an attention-history reader network that captures the patterns in the attention history. The results test on the Stanford Navigation Datasets show that our method achieves higher scores than the traditional model. |
| ZH1-838 11:00-11:15 | Bridge Target Detection in Remote Sensing Image Based on Improved YOLOv4 Algorithm<br>**Yu Peidong**, Wang Xin, Liu Jianhui, Xu Baiqi, Zhang Haobo and Wang Hui<br>Information Engineering University, China<br><br>*Abstract* - The automatic detection of bridge targets in remote sensing images is of great significance. By analyzing the YOLOv4 network structure and algorithm core ideas, according to the characteristics of remote sensing image bridge target detection, this paper adds 104×104 feature layer scale and combines the idea of attention mechanism to improve the algorithm network structure. At the same time, adjust the anchor point frame according to the characteristics of the bridge target scale to improve the performance of the YOLOv4 algorithm in the remote sensing image bridge target detection, and verify it through the design control experiment. The experimental results show that on the tailored DOTA bridge datasets, the bridge target precision and recall rate of the M-YOLO algorithm have been improved, and the average precision rate has increased by 5.6%, which proves the effectiveness of the improved algorithm. |
| ZH1-845 11:15-11:30 | Direct Prediction of BRAF V600E Mutation from Histopathological Images in Papillary Thyroid Carcinoma with a Deep Learning Workflow<br>**Zihan Wu**, Xiaoyang Huang, Shaohui Huang, Xin Ding and Liansheng Wang<br>Xiamen University, China<br><br>*Abstract* - Papillary Thyroid Carcinoma (PTC) is the most common type of thyroid cancer. BRAFV600E is a prominent oncogenic mutation and has been found to have strong associations with the mortality and recurrence of PTC. In this paper, we propose a workflow to show that BRAFV600E mutation status can be directly predicted from histopathological images with deep learning. Our method mainly consists of two steps, tumor detection and mutation classification; each of them contains a Convolutional Neural Network (CNN). The information derived from the two steps are combined to predict mutation. We propose three different strategies and build a PTC dataset of 6,541,586 512×512-pixel patches from 439 H&E stained Whole Slide Images (WSIs) to perform our experiments. In the PTC-V600E strategy, we use patches from 50 PTC WSIs and 202 |

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| | WSIs of 200 cases to train the two networks, respectively, and get an AUC of 0.884 on the test of 187 WSIs of 186 cases. In PCam-V600E and PAIP-V600E strategies, we use public datasets, PCam and PAIP 2019, of other cancer types instead of 50 PTC WSIs and get AUCs of 0.884 and 0.860. All the three strategies separate mutation-positive and negative cases successfully in our experiments, demonstrating the availability and feasibility of our work and its potential in further research and applications. |
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| ZH2-307<br>11:30-11:45 | Blind Quality Assessment for High Dynamic Range Video Systems<br>Dan Wang, **Mei Yu**, Zhidi Jiang and Yang Song<br>Ningbo University, China<br><br>*Abstract* - Compared with traditional imaging methods, high dynamic range (HDR) imaging techniques can provide the visual contents with wider dynamic range, higher contrast, and richer detail information. In HDR video system, distortion is inevitably produced during capturing, processing and coding HDR video, leading to the degradation of visual quality. Therefore, how to objectively assess the quality of HDR video is an important problem to be solved. This paper proposes a new blind HDR video quality assessment method based on luminance partition and motion perception, considering the perceptual impacts of texture and motion information in HDR video. Firstly, the distorted HDR video is divided into groups of frames (GoFs), and tensor decomposition is performed on each GoF to obtain its static information map containing the main spatial information and the corresponding motion information maps containing the main temporal information of HDR video. Considering the different visual perception to texture details of the bright, middle and dark regions in the distorted HDR video, the luminance partition is performed on the GoF's static information map to obtain the brightness, middle and dark regions, and the texture features are extracted from the different luminance partitioned regions to form the global and local texture perception feature sets. Then, considering the temporal perception, the motion information map is used to extract motion perception features and structure perception features. The extracted features are fused in the temporal to form the final feature set used to predict the quality of distorted HDR videos. Moreover, a subjective database of HDR videos is established to verify the effectiveness of the proposed method. Experimental results show that the proposed method can evaluate the HDR video quality accurately, and has good consistency with human visual perception. |
| ZH1-859<br>11:45-12:00 | Multi-attention Mechanism for Chinese Description of Videos<br>Hu Liu, **Jun Xiu Wu** and Jia Bin Yuan<br>Nanjing University of Aeronautics and Astronautics, China<br><br>*Abstract* - Using natural language to describe videos is a hot topic in the field of natural language processing and computer vision. However, most of the video description tasks are to generate English descriptions now, rarely to generate Chinese descriptions. This paper explores the process of generating Chinese descriptions for videos. An improved model of video description is proposed in this paper, which combines multi-modal features and multi-attention mechanism. The model extracts video information from global features and fine-grained features, and uses the multi-attention mechanism to focus more important video information in the decoding stage which can further improve the richness and accuracy of the generated descriptions. The model is applied to the extended Chinese corpus of MSVD (Microsoft Research video description corpus) and the highest METEOR value obtained is still 9.6% higher than the best result of video Chinese description on MSVD found at present. The model also achieves an advanced result compared with many state-of-the-art methods in English environment. |

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| ZH1-860<br>12:00-12:15 | SOS Intelligent Emergency Rescue System:Tap Once to Trigger Voice Input<br>**Muhammad Javed** and Xudong Luo<br>Guangxi Normal University, China<br><br>*Abstract -* Traffic accidents worldwide have caused ever-increasing death figures. By observing the significant number of casualties caused by traffic accidents, we can see worldwide road safety standards dropping significantly. In many cases, acquaintances or else urgent situation services are not notified within time. This can result into emergency services being delayed, which can, in turn, lead to death or serious harm. We decided to conduct research on speech recognition. The basic principle of this SOS Rescue mobile application is to use the concepts of artificial intelligence and voice-recognition. It is based on Google STT conversion. We have expanded the SOS Safe rescue system, the digital estimation of a speech software system. The STT system is based on methods and technologies that enable computers and computerized equipment to recognize as well as translate spoken language into text. Smart emergency hotline - With this intelligent application, we can use the theory and model of speech recognition, and STT (speech-to-text), and Google cloud services. Users will find the application vastly efficient in recognizing the voice of the wounded, and it can automatically convert voice into text-form. It can detect the real-time position of the accident. Upon the occurrence of the accident, a message is sent to the responder from the user automatically, and information will be collected in text form via voice recognition in addition to a link of the audio file and real-time positioning. Just tap once and trigger the SIS Rescue System and it starts working automatically. |

# Session 4 | 平行报告四

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## Sunday, 13 Dec. - 2020 年 12 月 13 日（星期日）

## 14:00-16:30, GMT+8

# Session 4

# Computer Science and Applied Technology

# 计算机科学及应用技术

**Zoom ID: 621 9203 5016**

**Zoom Link: https://zoom.com.cn/j/62192035016**

**Chaired by**

**Dr. Lam Meng Chun, Universiti Kebangsaan Malaysia, Malaysia**

**分会主席：Lam Meng Chun，博士，马来西亚国立大学**

**10 Presentations—**

**ZH2-310, ZH1-815, ZH1-828, ZH1-902, ZH1-848, ZH1-857, ZH1-842, ZH1-843, ZH1-851, ZH1-852**

Note:

* Please arrive at the conference rooms 5-10 minutes before the session start.

* Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.

* Certificate of Presentation will be sent to each presenter's email box after the conference.

* One Best Presentation will be selected from each parallel session and the author of best presentation will be announced at the end of this session.

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| **ZH2-310**<br>14:00-14:15 | A Blockchain-based System for Student E-portfolio Assessment using Smart Contract<br>Gang Zhao, **Hui He**, Bing bing Di, Qing Xia and Zhen Fu<br>Central China Normal University, China<br><br>*Abstract* - Nowadays, as student e-portfolio systems increase in popularity, the large storage space and convenient retrieval of e-portfolio system provide a more efficient way for heavy file management, while the security concerns about personal information and privacy of students arise. The traditional student e-portfolio system adopts a centralized system which caused some problems such as an organization that has full control over the information that could tamper with the database, the insecurity of student e-portfolio. However, blockchain application has mushroomed, providing opportunities for solving the shortcomings proposed above. In this paper, we combine with the fabric blockchain technology to implement student e-portfolio system for permanently recording student growth information, which uses smart contract to realize the registration and authentication of student identity, the portfolio recording and management, the publication of learning evaluation. Finally, we analyze the system compared with traditional system, and the comparative result indicates that the proposed system can not only effectively manage student information, but also protect privacy. |
| **ZH1-815**<br>14:15-14:30 | Font Generation Method based on U-net<br>**Ming Liu**, Xin Chen and Gang Liu<br>Hubei University of Technology, China<br><br>*Abstract* - The main task of the font design is to design a suitable font according to the actual application scenario, which has extremely wide commercial application value. Generally the traditional font design requires professionals to design, with longer design time, lower work efficiency, and higher labor costs. Font design is essentially a problem of image synthesis. U-net is a deep learning network structure, which has been widely used in image synthesis, but the images synthesized by U-net have the disadvantages of low image quality and poor visual effects. In order to improve the shortcomings of U-net image synthesis effectively, this paper provides an improved U-net method for better font design. The new method is called Swish-gated residual dilated U-net (Swish-gated residual dilated U-net, SGRDU). In SGRDU, the proposed swish layer and swish-gated residual block can effectively control the information transmitted by each horizontal and vertical layer in U-net, and accelerate the network convergence. Dilated convolution is used to improve the perception of the network. Experimental results show that, compared with other residual U-net, the font synthesized by SGRDU has better visual effect and quality. |
| **ZH1-828**<br>14:30-14:45 | Context Augmentation Aggregation Network for Nuclei Segmentation<br>**Ruizhe Geng** and Wenmin Wang<br>Macau University of Science and Technology, China<br><br>*Abstract* - Nuclei Segmentation plays an important role in cancer malignancy grading and assisted diagnosis. Due to the high variations of nuclei appearances among diverse cell types, this task remains challenging. Current box-free instance segmentation methods typically rely on pixel-level information. These methods tend to over- or under - segmentation due to the lack of global information. On the contrary, the box-based instance segmentation methods with object detectors perform better when locating and segmenting individual instances. In this paper, we propose a Context Augmentation Aggregation Network (CAANet) to extract discriminant features of objects of different sizes to improve the performance of segmentation. We investigate a new branch which supplements context information from multiple receptive fields. Experimental results on a |

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| | publicly available Kaggle 2018 Data Science Bowl dataset shows that our method is comparable to existing methods. |
| ZH1-902<br>14:45-15:00 | The Dilemma and Countermeasures of AI in Educational Application<br>**Ling Xu**<br>Henan University, China<br><br>*Abstract* - This paper divides the application of AI in education into three categories, namely, students-oriented AI, teachers-oriented AI and school mangers -oriented AI, which focuses on the individualized self-adaptive learning of students, the assisted teaching of teachers and the service management efficiency of schools respectively. With the continuous integration of AI technology and education, although we see a bright future in the field of AI in education, It can be seen that many obstacles will still exist in the future by reviewing the tortuous and difficult development history of AI in education for decades. Due to the dilemmas such as the inexplicability of algorithm, the limitations of algorithm, data bias, privacy leakage, etc., the application of AI in the education may face difficulties and obstacles in technology, effect, law, ethics, and system level, etc. Logically proposing the countermeasures to meet the development of AI education will be very helpful in dealing well with the difficulties and obstacles effectively. Abiding by the principles such as transparency, integration, diversification, popularization, fairness, accountability, security, privacy protection, humanistic education and other principles and ways is to effectively apply AI in education, thereby promoting the technological integration in the development of educational innovation safely and effectively. |
| ZH1-848<br>15:00-15:15 | SWSD: An Abnormal Detection Algorithm on Unequally Spaced Time Series for Disaster Prediction<br>**Qinyong Li**, Haoming Guo, Xinjian Shan, Zhixin Wang, Yanyan Wei, Jianxiu Bai and Qiuhong Zhang<br>Software Institution China Academy of Science, China<br><br>*Abstract* - Natural disasters cause enormous damage. Time series analysis is an effective way to predict natural disasters. To cope with classical methods can not directly applied to unequally spaced series, in this paper we propose a series of methods for abnormal detection on unequally spaced time series for disaster prediction. The main contribution of this paper has three-folds: (1) we define the concept of optimal interval for unequally spaced series; (2) based on the concept of optimal interval, we propose an algorithm to fill missing data in unequally spaced series; and (3) we propose an algorithm, called SWSD, which can be used in unequally spaced time series abnormal detection for disaster prediction. Experiment on real observation data sets demonstrates the effectiveness of the proposed work. |
| ZH1-857<br>15:15-15:30 | A Fast Transform Algorithm based on VVC<br>**Keke Ding**, Dong Jiang, Feiyang Zeng, Jucai Lin and Jun Yin<br>R&D Center Zhejiang Dahua Technology Co.,Ltd, China<br><br>*Abstract* - Versatile Video Coding and Test Model (VTM) reference codecs, which is developed by Joint Video Experts Team of ISO/IEC and ITU-T, utilize multiple types of integer transforms based on DCT and DST of various transform sizes for intra and inter-predictive coding. It has brought a considerable gain in BDBR performance. VVC adopts three types of integer transform kernels (DCT-II, DCT-VIII and DST-VII). In addition to the fast algorithm of DCT-II, there is little research on fast algorithms of other transform kernels such as DCT-VIII, DST-VII, DCT-IV, DST-IV. In this paper, we present a fast transform algorithm based on VVC. First of all, we extract cyclic convolution matrices from |

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| | the transform matrix. Then, according to the properties of cyclic convolution, we reduce the required number of multiplications and additions for transform. In various experiments, the proposed fast calculation method effectively reduces the total matrix complexity without any loss in BDBR performance. In particular, the proposed method achieves 30% average time saving in transform part compared to the original VTM 10.0. |
| ZH1-842<br>15:30-15:45 | Identifying Influencers in Thai Internet Forum based on Topic-oriented Gravity Model<br>**Jirateep Tantisuwankul**, Bundit Manaskasemsak and Arnon Rungsawang<br>Kasetsart University, Thailand<br><br>*Abstract -* The task of identifying influencers provides a lot of benefits for various practical applications such as recommendation systems, viral marketing, and information monitoring. This issue can traditionally be solved via a network structure with several proposed graph algorithms. However, most of them employ a global computation with much time-consuming; some consider only undirected and unweighted networks which may be inconsistent with the nature of data. Inspired by the law of gravity in Physics, we present the Topic-oriented Gravity Model (TopicGM) that investigates a directed and weighted network incorporating users' topical aspects. The key concept is that an individual is first represented as a textual content he created or read. Afterwards, TopicGM simply adopts a topic modeling, i.e., the Hierarchical Dirichlet Process (HDP), to classify topics over those contents. A topical network is then constructed where nodes represent individuals and an edge connects two individuals in the direction from the poster to the reader with a topical confidence weight. Finally, we apply the gravity formula to calculate influence scores and rank individuals. The experimental results conducting on a real-world data, collected from Pantip.com (a famous Thai web forum), show that our approach outperforms many state-of-the-art baselines by accurately identifying influencers within the top of rankings. |
| ZH1-843<br>15:45-16:00 | Paraphrase Detection with Dependency Embedding<br>**Xiaoqiang Chi** and Yang Xiang<br>Tongji University, China<br><br>*Abstract -* Paraphrase detection is an important task with implications for machine translation, information retrieval, summarization and question answering, among other applications. Inspired by previous work utilizing syntactic information for this task, we propose a novel approach that combines dependency relations with a simple neural network. The dependencies are extracted from a sentence pair with an off-the-shelf natural language processing toolkit, then they are divided into two sets by alignment, one for the dependencies that are common to both sentences, the other set contains unmatched dependencies. Both sets of dependencies are then embedded, using two different embedding schemes for dependency types and head-modifier word pairs. Finally, these dependency embeddings are fed into neural nets to get the classification results. Our model learns a soft weighting scheme for similarities and dissimilarities between a sentence pair automatically. Through extensive experimentation, we show that by embedding syntactic dependency, we can effectively combine linguistic information with neural networks for the task of sentential paraphrase detection. |
| ZH1-851<br>16:00-16:15 | Two-stream Adaptive Convolutional Neural Network for Crowd Counting<br>Qijun Zhang, Songling Fu, Dan Li, **Yang Mo**, Li Liu and Chuanfu Xu<br>Hunan Normal University<br><br>*Abstract -* Due to the high crowd density in some scenes and the large difference in crowd feature scales, it is difficult to count the number of people. The structure of multi-branch CNN can deal with the feature of different scales, improve the accuracy of crowd counting, |

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| | but also increase the parameters and complexity. In this paper, a 2S-ACNN with simple structure and balanced performance is proposed for crowd counting in a single frame image. The network structure uses different size of receptive field to deal with the feature of different scales, and adds multi-scale pooling structure to carry out feature fusion, which improves the representation ability of the network. The experimental results show that this method can maintain fewer parameters and achieve lower error and higher accuracy. |
| ZH1-852<br>16:15-16:30 | Diabetes Disease through Machine Learning: A comparative study<br>Gonçalo Marques, Ivan Miguel Pires and **Nuno M. Garcia**<br>Universidade da Beira Interior, Covilhã, Portugal<br><br>*Abstract -* Diabetes is a critical problem in developed and developing countries. The early detection of this disease is crucial for efficient and effective treatment. Moreover, the application of machine learning for disease detection is a trending topic. There are numerous machine learning methods available in the literature. The main contribution of this paper is to present a preliminary study on the application of machine learning methods on a public and widely used diabetes dataset. The authors have applied eight different machine learning techniques using PIMA diabetes dataset. The data have been normalized, and Neural Networks, SGD, Random Forest, kNN, Naïve Bayes, AdaBoost, Decision Tree and SVM methods have been applied. First, the techniques have been validated using stratified 10-fold cross-validation. Second, the confusion matrix has been extracted for each method, and the accuracy, recall, precision and F1-score have been calculated. The three methods with better results are Neural Networks, SGD and kNN. These methods report 77.47%, 76.43% and 73.96% of average accuracy between classes. |

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**Sunday, 13 Dec. - 2020 年 12 月 13 日（星期日）**

**14:00-16:30, GMT+8**

## Session 5

## Computer and Electronic Engineering

## 计算机与电子工程

**Zoom ID: 647 3202 1668**

**Zoom Link: https://zoom.com.cn/j/64732021668**

**Chaired by**

**Prof. Shigang Yue, University of Lincoln, UK**

**分会主席：Shigang Yue，教授，英国林肯大学**

**10 Presentations—**

**ZH1-807, ZH1-826, ZH1-903, ZH1-830, ZH2-302, ZH1-819, ZH1-854, ZH1-827, ZH1-839, ZH1-816**

Note:

\* Please arrive at the conference rooms 5-10 minutes before the session start.

\* Timing: a maximum of 15 minutes in total, including 2-3 minutes for Q&A. Please make sure your presentation is well timed.

\* Certificate of Presentation will be sent to each presenter's email box after the conference.

\* One Best Presentation will be selected from each parallel session and the author of best presentation will be announced at the end of this session.

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| **ZH1-807**<br>14:00-14:15 | Location and Cost Optimization of Datacenters and Solar Power Plants<br>**Dingchang Huang**, Xuejiao Yang and Xiaoying Wang<br>Qinghai University, China<br><br>*Abstract* - The location deployment of datacenters and solar power plants involves various factors including local economic situation, land price, electricity price and so on. The selection and optimization of a large number of parameters make the decision-making process complicated and time-consuming. To solve this problem, an optimization framework is designed for the location deployment of datacenters and solar power plants in the power grid, considering transmission loss of the power grid system, the cost and revenue of datacenters and solar power plants. Under the constraint conditions to ensure the stable operation of the power grid, the appropriate deployment scheme of datacenters and solar power plants is found by solving the established optimization problem. Experimental results show that in the case of a single solar power plant and a single datacenter, the proposed strategy can reduce the cost of solar power plant by 11.6% and the transmission loss by 18.6%. In the case of a single solar power plant and two datacenters, the scheme found by our proposed method could increase the annual revenue of the datacenter and greatly reduce the total transmission loss. |
| **ZH1-826**<br>14:15-14:30 | A Liquid-lens based Defect Inspection Algorithm for Optical Isolators<br>Tian Qiu, **Zhiquan Lin**, Chen Jung Tsai, Chi Shing Wong, Junlin Chen, Xin Zhang and Honglong Ning<br>Wuyi University, China<br><br>*Abstract* - As one of the basic optical components, optical isolator is widely used in optical communication equipment. Currently the inspection for optical isolator is mainly manually done by visual inspection by workers. The manual inspection method is time-consuming and laborious, and it often hurts inspectors' eyesight. Based on the physical structure of the optical isolator, an automatic defect inspection algorithm using liquid lens is proposed. The proposed algorithm can first locate the surface of the transparent optical isolator, then inspect several defects on the surface of the optical isolator. The experiments show that the algorithm achieves satisfactory results in the detection inspection, which can reduce the manpower demand of the visual inspection to less than 10%. |
| **ZH1-903**<br>14:30-14:45 | Skeleton-bridged Mesh Saliency and Mesh Simplification<br>**Wanna Luan** and Chengming Liu<br>Zhengzhou University, China<br><br>*Abstract* - This paper presents a local-to-global framework for mesh saliency, which can measure the visual importance in agreement with human perception. Firstly, based on Voronoi diagram, we give a new descriptor which does not only compute the local saliency, but also facilitates the computation of 3D skeleton and global saliency. Then we calculate the global saliency based on skeleton extraction and hierarchical clustering. In addition, an effective denoising method is exploited to guarantee the smoothness of skeletons and clustering accuracy. At last, we put forward a new solution to integrate local and global saliency to obtain a visually better result. Large amounts of models are tested which demonstrate that our results are consistent with human-marked interest points. We also apply the saliency score on mesh simplification to get visually saliency-aware simplification results. |

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| **ZH1-830**<br>14:45-15:00 | A Driving Scheme for Non-standard and High-resolution Display and Its Realization<br>**Peiwen Wu**, Xin Zhang, Jianbang Wu, Jian Yang, Bohua Zhao, Tian Qiu and Honglong Ning<br>Wuyi university, China<br><br>*Abstract -* In recent years the functionality and resolution of display devices are constantly improving, not only due to the continuous optimization of the performance of various luminescent materials, but also due to the continuous iteration and development of display drive technology. As the carrier of display driving technology, the display driving chip can be called the heart of the display screen. When the high-resolution display screen is with very high resolution, it is challenging to design an efficient driving system. A newly designed driving system is presented in this paper, which uses dual FPGAs to co-work in order to improve the performance of the display's driving system of the large-size display screen. |
| **ZH2-302**<br>15:00-15:15 | Fast Authentication Protocol With Privacy Preserving For Large-Scale Power LTE Private Network Terminals<br>**Jin Huang**, Weiwei Miao, Mingxuan Zhang, Li Zhang, Liwu Zhang and Shuang Yang<br>State Grid Jiangsu Electric Power Co., Ltd. information communication branch, China<br><br>*Abstract -* The construction of Power LTE Private Network privacy protection authentication protocol based on a symmetric cryptosystem is a hot issue in academic and industrial research. The integrity privacy protection protocol is not efficient enough, because it is necessary to exhaustively search all terminals in the system, which is difficult to apply to the environment of mass terminals in the Internet of Things. This paper presents a method for constructing an efficient privacy protection authentication protocol for power LTE private network terminals. This protocol uses a single-bit output pseudo-random function. In this paper, the authentication process of the protocol is broken down into multiple steps. Compared with traditional protocols, the proposed protocol significantly improves search efficiency. The protocol has privacy and small computational overhead, so it can be applied to the network environment of a large number of terminals. |
| **ZH1-819**<br>15:15-15:30 | A Review of Latest Multi-instance Learning<br>**Tian Yuan**<br>The Army Engineering University of PLA, Nan Jing, China<br><br>*Abstract -* Due to the application needs of some special scenarios, multi-instance learning problem has been paid more and more attention in recent years. Different from the traditional supervised learning problem, each example in the training set of multi-instance learning is not represented by a single feature vector, but a group of feature vectors, the example is called bag, and the vector contained in them are called instances. Multi-instance learning is widely used in many real scenarios. Therefore, it has become an important topic in machine learning, and many algorithms related to multi-instance learning have been proposed successively. In this paper, the latest applications of multi-instance learning in some real scenarios are described in detail, the main ideas of some new multi-instance learning algorithms are given, and finally summarizes and prospects. |
| **ZH1-854**<br>15:30-15:45 | An Improved PCB Defect Detector Based on Feature Pyramid Networks<br>**Dan Li**, Songling Fu, Qijun Zhang, Yang Mo, Li Liu and Chuanfu Xu<br>Hunan Normal University, China<br><br>*Abstract -* Aiming at the problem of false alarm in PCB defect detection in the automatic optical inspection process, many researchers have proposed their methods, but most of |

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| | them only classify the single defect in single image, and there are multiple defects and multiple categories in single image. In this paper, a real PCB data set consisting of 1540 images generated by AOI is introduced for the detection and classification task. In addition, we propose an improved PCB defect detector based on feature pyramid networks. The detector combines Faster R-CNN and FPN as the infrastructure, and has been adjusted and improved, mainly including the following three innovations: 1) SE module is inserted into the feature extraction backbone network resnet-101, which improves the expression ability of network. 2) An enhanced bottom-up structure is introduced to enhance the whole feature level by using accurate low-level positioning signals. 3) ROI Align is used instead of RoI Pooling to reduce the impact of dislocation on small object defect detection. The experimental results show that, compared with the mainstream object detection network, the proposed method achieves better accuracy, reaching 96.3% mAP, and has better performance for defect detection and classification. |
| ZH1-827<br>15:45-16:00 | On the Effects of Skip Connections in Deep Generative Adversarial Models<br>**Yulin Yang**, Rize Jin and Caie Xu<br>Tiangong university, China<br><br>*Abstract -* Deep convolutional neural networks provide significant contribution to GANs in stabilizing the GAN training. However, the convolution operator has a local receptive field and therefore geometric or structural patterns of complex images can only be processed after passing through several convolutional layers. Recent studies suggest that the network depth is indeed of crucial importance for GANs to generate images with consistent objects/scenarios to a certain extent, but it also amplifies the mode collapse problem. As a solution, we investigate a skipping mechanism for going deeper in GANs. By passing the input of layers as a weighted residual, it alleviates the phenomenon of mode collapse. Experimental results show that the proposed method increases the capacity of modeling long range dependencies while retaining the local invariance property obtained by using a relatively small convolution kernel. |
| ZH1-839<br>16:00-16:15 | Teenagers from Centre of Portugal: Nutrition and Physical Activity Data<br>María Vanessa Villasana, Ivan Miguel Pires, Juliana Sá, Eftim Zdravevski, Ivan Chorbev, Petre Lameski and **Nuno M. Garcia**<br>Universidade da Beira Interior, Portugal<br><br>*Abstract -* We present a dataset related to the teenagers and their physical activity and nutrition habits from two schools of Covilhã and Fundão municipalities (Portugal). It is related to the initial questionnaire distributed by the mobile application named CoviHealth. This mobile application was distributed to twenty-six individuals aged between 13 and 18 years old with different nutrition and physical activity habits. This paper describes the data acquired through the filling of the data by the teenagers, which was available at the first utilization of the mobile application. The data collected is related to anthropometric values, physical activity, diet, and habits. It was statistically processed to analyze the current practices of the teenagers from the different municipalities, verifying that, in average, the teenagers reported a Body Mass Index (BMI) Percentile equals to 59.19 that corresponds to a normal state, a consumption of only one piece of fruit or vegetables a day, a practice of physical exercise at least 2 to 3 times a week between 1 and 2 hours, and a number of sleeping hours equals to 8.12 hours. |
| ZH1-816<br>16:15-16:30 | Using Triangular Exchange Mechanism to Accelerate the Pre-training Convergence Speed of BERT<br>**Jingjing Liao**, Nanzhi Wang and Guocai Yang<br>Southwest University, China |

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*Abstract* - As a current-leading language representation model, BERT is entirely constructed by self-attention. The special weighted sum method of the self-attention mechanism can capture the longer-term dependency, meanwhile unable the modeling of timing sequence information structurally. BERT added position embedding to alleviate this problem, but we noticed that this would also lead to inaccurate context modeling in the early stage of training. We propose a novel approach, Triangle Exchange (TE), optimizing the model internal structure to make context modeling more accurate. The method enables the attention values of each token to its above and below tokens to be calculated from different heads by special disposing of self-attention matrices, thus expanding the variable range of the difference be-tween contextual attention values for a given token. Experiments show that TE can be flexibly applied to the self-attention mechanism, significantly improves the convergence speed of the masked LM model, and obtains higher accuracy on the pre-training procedures compared with BERT.