
# NExT++ WORKSHOP 2018 @

# NANJING 南京

## AI IN HEALTH & FINANCE

**Nanjing University of Science and Technology, Jiangsu, China**

**1-2 November 2018**

# WORKSHOP PROGRAM

**1 NOVEMBER 2018 (DAY 1)**

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|---|---|
| 0900 – 0930 | **Opening,** by Prof Chua Tat Seng (NUS), Prof Sun Maosong (Tsinghua University) & Prof Dame Wendy Hall (University of Southampton) |
| 0930 – 1020 | **Session 1: AI in Healthcare** |
| | Talk 1: "ALiVE: AI for Lifestyle self-management, Validation and Empowerment" by Dr Ming Zhaoyan (NUS) |
| | Talk 2: "Context-aware Interventions for Wellness" by Prof Liu Yiqun (Tsinghua University) |
| 1020 – 1050 | **Morning Tea** |
| 1050 – 1250 | Talk 3: "Future E-Healthcare Model" by Dr Gong Qingxian (Shangdong Sunus) |
| | Talk 4: "Precision Nudging and Game-based Profiling" by Dr Yu Rongjun (NUS) |
| | Talk 5: "Edge Computing for Understanding and Improving Medical Adherence" by Prof Ooi Wei-Tsang (NUS) |
| | Discussion Session 1: Technologies, Sensors, People, App & Future of Wellness |
| 1250 – 1400 | **Lunch & Demo Session** |
| 1400 – 1600 | **Session 2: Blockchain-based Platform for Wellness and Fintech Applications** |
| | Introduction by Prof Sun Maosong (Tsinghua University) |
| | Talk 6: "Blockchain Technology and Its Future Applications" by Dr Huang Butian (Yunphant) |
| | Talk 7: "Blockchain and Fiat Digital Currency: the First Step" by Prof Chen Kang (Tsinghua University) |
| | Talk 8: "Fundamental Infrastructure for Blockchain Application and Eco-system", by Di Shuo, Arxan Fintech) |
| 1600 – 1630 | **Afternoon Tea** |
| 1630 – 1730 | Talk 9: "Enabling Trust, Accountability, and Routine Use of AI-Enabled Healthcare", by Dr Richard Giordano, Reham Al Tamime & Peter West (University of Southampton) |
| | Discussion Session 2: Platform for Security, Privacy, Data Sharing and Ownership |
| 1730 | **End of Day 1** |

**2 NOVEMBER 2018 (DAY 2)**

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| 0900 – 1030 | **Session 3: Explainability, Robustness and Fairness in AI** |
| | Talk 10: "Explainability, Robustness and Fairness: in Recommendation Systems as the Example" by Prof Zhang Min (Tsinghua University) |
| | Talk 11: "AI and Unstructured Analytics in Fintech" by Ritchie Ng (Ensemble Capital) |
| | Talk 12: "Reasoning over Linked Data for Explainable Recommendation" by Wang Xiang & Dr He Xiangnan (NUS) |
| 1030 – 1100 | **Morning Tea** |
| 1100 – 1230 | Talk 13: "Knowledge-guided Natural Language Processing" by Prof Liu Zhiyuan (Tsinghua University) |
| | Short Talk 14: "Video Relation Inference" by Shang Xindi (NUS) |
| | Discussion Session 3: Explainability, Robustness and Fairness in AI |
| 1230 – 1300 | **Summary** |
| 1300 | **End of Day 2** |

# RESEARCH TALKS

**Session 1: AI in Healthcare**

**1. ALiVE: AI for Lifestyle self-management, Validation and Empowerment:** We aim to tackle the problem of 3H (Hyperglycemia, Hypertension, Hyperlipidemia) in the population by leveraging state-of-the-art AI technologies to empower patient self-management and to support primary care practitioners. To facilitate the tasks of lifestyle data gathering, analytics, action planning and sharing: the four key AI research technologies underpinning the whole research include: advanced AI lifestyle analytics; private and explainable machine learning; personalized nudging and influence; and incentives for data sharing and analytics. The ultimate goal of ALiVE is to empower, assist and inspire patients, doctors and governments to work together using sustainable solutions to promote early diagnosis, treatment and prevention of chronic diseases.

**2. Context-aware Intervention for Wellness:** In this talk, we will review related research efforts in the search and recommendation communities for improving wellness of human beings. It includes identification of users with certain health status, exploratory search support for health information, and recommendation based on health status. We also propose possible research directions in the interventions step of the AliVE project.

**3. Future E-Healthcare Model:** Shortage and wastage of medical resources, which are two current critical issues, continue to burden the Chinese healthcare system. In Sunus, we help the hospital to transform their medical treatment process by using technology advantage and big user pool. At the same time, we help them to refine their treatment structure in optimizing their medical resources. In this talk, I will explain more from the angle of “convenience for medical treatment” and “Internet treatment”.

**4. Precision Nudging and Game-based Profiling:** In recent years, there is mounting interest in approaches that steer people’s behaviour in particular directions without forcing certain outcomes upon anyone. However, many programs use a one-size-fits-all approach and miss the opportunity to use micro-targeting to create personalized interventions that influence individuals based on their attitudes, values and lifestyle. We propose that using unbiased game-based psychological tasks, combined traditionally used standard surveys, allows researchers to better profile individuals and to provide well targeted nudges.

**5. Edge Computing for Understanding and Improving Medical Adherence**: Medical adherence refers to the degree to which a patient accurately follows medical advice given by healthcare professionals, including whether they take medication as prescribed, are they taking the right dosage, and at the right timing. It is challenging for children and young adult patients who need long-term medication to comply due to their lifestyle and the need to balance between their study, social activities, and possibly work. This talk aims to highlight the importance of the problem and the challenge that the patients face and identify some open research challenges towards improving medical compliance that involve computer networking, sensors, multimodal-multimedia data and AI research.

**Session 2: Blockchain-based Platform for Wellness and Fintech Applications**

**6: Blockchain Technology and Its Future Applications:** The integration of consortium blockchains and public blockchains is inevitable. Blockchain is not merely a technology, but also a decentralized incentive-based system. The infrastructure and demonstration of its applications are the current focus of the industry breakthrough. In this talk, we will talk about some used cases of blockchains in fintech and healthcare domains, as well as to analyze the new trend of its applications.

**7. Blockchain and Fiat Digital Currency: the First Step:** Blockchains seem to provide the promising technology for financial revolution. However, currently, it is still not mature enough to be used as the next generation of financial infrastructure. I will first describe the current banking system and some work from the Digital Currency Research Institute of Central Bank of China. The work is the first step to implement fiat digital

currency, before the payment system. There are special requirements to build such a payment system, but some of them are not a viable solution.

**8. Enabling Trust, Accountability, and Routine Use of AI-Enabled Healthcare**: In this talk, we consider three scenarios for using AI to make sense of citizen-generated health data. In the first scenario, a patient who uses wearables presents their data to a doctor, who can then use AI-based decision support to tailor treatment to that patient. In the second scenario, we consider how large-scale datasets can be used to create computational models to support algorithms and heuristics to make diagnostic and/or prognostic inferences in support of personalized medicine. While this holds great promise, there are algorithmic accountability and personal privacy issues that need to be addressed. In the third scenario, we try to understand patients' privacy concerns and their comfort level in sharing sensitive information in various healthcare contexts. When we consider these together, we gain some insight into how to engender trust, accountability, and routine use of AI-enabled healthcare from both clinicians and patients.

**Session 3: Explainable, Robustness and Fairness in AI**

**9. Explainability, Robustness and Fairness: in Recommendation Systems as the Example:** In this talk, I will discuss on explainability, robustness and fairness in the background of recommender systems, in which these are the significant and trending topics. Some recent progress on heterogeneous explainable recommendation will be introduced, together with our efforts on making robust recommendation on different scenarios of warm and cold start, and our attempt on fairness-aware group recommendation.

**10. AI and Unstructured Analytics in Fintech:** We will discuss on unexplored applications of supervised learning in predicting pre-defined market regimes in broad themes like risk-on and risk-off environments, to more concentrated themes of currency strength and weakness, to localized themes isolated to regions like turkey and Scandinavian regions. Second, we will be discussing unsupervised learning in identifying unique market regimes like implied and historical volatility and correlations in equity markets against treasury yield differentials. On top of the use of AI and unstructured analytics in predicting market regimes, this workshop shows first-hand the availability and types of data sources from major banks.

**11. Reasoning over Linked Data for Explainable Recommendation:** Connectivity information derived from linked data endows recommender systems the ability of reasoning and explainability. In particular, linked data, spans from user-item interactions to knowledge graph, organizes background knowledge of users and items in the form of triplets. Such triplet is in the form of two entities and interlinks. By exploring the interlinks, the connectivity among entities reveals the information flow between users and items, driving the exploration (or propagation) process of user interests. Furthermore, reasoning along such connectivity not only infers user preference, but also offers explanations. In this work, we will introduce our two recent work: how to explore the information flow over the user-item interaction graph and reason on the paths within a knowledge graph to infer user preferences.

**12. Video Relation Inference:** Relation understanding is critical towards find-grained video content understanding. Unlike recognizing object entities, which is usually visible in video, recognizing the relations among them is more complicated because most of relations are not directly visible in short-term. Hence, the visual relations become especially important to bridge the vision and "mind", in which many relations can be inferred then. In this talk, I will brief our research work on visual relation detection (VRD), including a fine-grained annotated video dataset ready to publish. Also, I will discuss about potential ways to build upon the stage of video VRD and do more relation inference required by upstream applications.