香港中文大學
院士講座系列

The 11th Lecture Series by Academicians from the Chinese Academy of Sciences (CAS)

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Speaker: **Prof. XU ZONG BEN**
Division of Information Technical Sciences
Chinese Academy of Sciences
中國科學院信息技術科學部徐宗本院士

Title: **Model Driven Deep Learning**

Date: Wednesday, 28 February 2018

Time: 16:00 – 17:30
Light refreshments will be served at 16:00 at Room 121 Lady Shaw Building

Venue: LT 1, Lady Shaw Building

Registration: http://www.cuhk.edu.hk/oalc/cas_2018/

簡歷

中國科學院院士，數學家、信號與信息處理專家、西安交通大學教授。主要從事應用數學、智能信息處理、機器學習、數據建模基礎理論研究。曾提出稀疏信息處理的L(1/2)正則化理論,為稀疏微波成像提供了重要基礎；發現並證明機器學習的"徐-羅奇"定理, 解決了神經網絡與模擬演化計算中的一些困難問題,為非歐氏框架下機器學習與非線性分析提供了普遍的數量推演準則; 提出基於視覺認知的數據建模新原理與新方法，形成了聚類分析、判別分析、隱變量分析等系列數據挖掘核心算法, 並廣泛應用於科學與工程領域。曾獲國家自然科學二等獎、國家科技進步二等獎、中國CSIAM蘇步青應用數學獎, 並在世界數學家大會(2010, 印度)上作45分鐘特邀報告。曾任西安交通大學副校長。現任中國科學院信息技術科學部副主任、西安交通大學西安（國際）數學與數學技術研究院院長、大數據算法與分析技術國家工程實驗室主任。是國家大數據發展專家委員會成員、中國新一代人工智能諮詢專家組成員。

Model Driven Deep Learning

Deep learning (DL) has becoming a powerful, standard AI technology which helps to yield increasingly breakthroughs of learning system applications. As a representative of data driven approach, it faces however many challenges like contradictions between standardization and personalization, versatility and efficiency, the difficulties in design, anticipation and explanation for the results, and the serious dependence upon the amount and quality of training samples. On the other hand, the model-driven approach provides another learning paradigm that bases on the physical mechanism and prior modeling, which has the characteristics of determinacy and optimality while meets with obstacle of impossibility of precise modeling. In this talk we propose and formalize a data & model dual-driven learning approach, which define then the model driven deep learning (MDDL). The model driven deep learning start with construction of a Model Family (MF), which is a rough description of solution of the problem under consideration, followed then by the design of an Algorithm Family (AF) which is a collection of iterations whose limit give the solution of the model family. The Algorithm Family then unfolded into Deep Architecture (DA) with which learning can be performed. We provide examples to substantiate the effectiveness and superiority of the MDDL over others. We particularly show the following advantages of MDDL: It recedes the requirement for precise modeling in model-driven learning, provides the sound methodology for the DL network design, making it easy to incorporate into prior knowledge to make DL more efficient, designable, predictable and interpretable, and also significantly reduce the number of samples needed for DL training. Based on this study, we conclude that MDDL has great potential in the future DL research and applications.

Language: Putonghua/English

ALL ARE WELCOME
Enquiries: 394-37952 / 38727