



『清华信息大讲堂』第 63 讲

报告题目:	Self-Validated Labeling of Markov Random Fields for Image Segmentation	Self-Validated Story Segmentation of Chinese Broadcast News Using Subword Normalized Cuts
报告时间:	2010-10-25, 上午 9:30-11:30	2010 年 10 月 26 日上午 09: 30-11: 30
报告地点:	清华大学, FIT 大楼 1-312	清华大学, FIT 大楼 1-312
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Abstract:

In this talk I will address the problem of self-validated labeling of Markov random fields (MRFs), namely to optimize an MRF with unknown number of labels. We present graduated graph cuts (GGC), a new technique that extends the binary s-t graph cut for self-validated labeling. Specifically, we use the split-and-merge strategy to decompose the complex problem to a series of tractable subproblems. In terms of Gibbs energy minimization, a suboptimal labeling is gradually obtained based upon a set of cluster-level operations. By using different optimization structures, we propose three practical algorithms: tree-structured graph cuts (TSGC), net-structured graph cuts (NSGC) and hierarchical graph cuts (HGC). In contrast to previous methods, the proposed algorithms can automatically determine the number of labels, properly balance the labeling accuracy, spatial coherence and the labeling cost (i.e., the number of labels), and are computationally efficient, independent to initialization and able to converge to good local minima. We apply the proposed algorithms to natural image segmentation. Experimental results show that our algorithms produce generally feasible segmentations for Benchmark datasets, and outperform alternative methods in terms of robustness to noise, speed and preservation of soft boundaries.

Automatic story segmentation is an important prerequisite for semantic-level content retrieval. The normalized cuts (NCuts) method has recently shown great promise for segmenting English spoken lectures. However, the availability assumption of the exact story number per document significantly limits its feasibility to handle a large number of files. Besides, how to apply such method to another language in the presence of speech recognition errors is unknown yet. This talk I will address the two problems by proposing a self validated NCuts (SNCuts) algorithm for segmenting Chinese broadcast news via inaccurate lexical cues, generated by the Chinese large vocabulary continuous speech recognizer (LVCSR). Due to the specialty of Chinese LVCSR, we present a subword level graph embedding to the erroneous transcripts. We regularize the NCuts criterion by an exponential prior of story numbers, respecting the principle of Occam's razor. Given the maximum story number as a general parameter, our method can obtain reasonable segmentations for a large number of news transcripts, with the story numbers automatically determined for each file, and with only slightly increased complexity. Extensive experiments on benchmark datasets show that: (i)our SNCuts algorithm can efficiently produce comparable (or even better) segmentation quality, as compared to other state of the art methods; (ii)the subword embedding always contributes to recovering the lexical cohesion of Chinese erroneous transcripts, thus improving both the segmentation accuracy and robustness to LVCSR errors.

Biography:

Dr Liu has worked in both academic and industry. He has taught in three Universities in Canada, the University of Melbourne, and City University of Hong Kong, SAR, China. Since joining the School of Creative Media, he has initiated a number of research and development projects on media/graphics systems that offer media students, content creators, and users new, intelligent active platforms. He has successfully supervised numerous, mostly PhD, postgraduate students in computer science, media technologies, and more recently, media art.

Dr Liu has served numerous international conferences as chairman or member of program committees. He is an Associate Editor and Guest Editor for more a dozen major international journals. Professor Liu was the Vice-Chairman and Chairman of IEEE Systems, Man and Cybernetics (SMC) Society, Hong Kong Chapter, co-founder and Chairman of IEEE SMC International Technical Committee on Media Computing (TCMC), and a member of IEEE International Technical Committee on Fuzzy Systems (TCFS). Dr Liu was invited as distinguished Professor by universities in China, Canada and Italy and presented many keynote speeches at international conferences. He was an IEEE Distinguished Lecturer in IEEE SCMS.

Professor Liu was the Director and Principal Investigator of Computer Vision and Machine Intelligence Lab (CVMIL) and then of the Intelligent Systems Lab (ISL) at the Department of Computer Science and Software Engineering, The University of Melbourne, Australia.

As part of the China's Space Program initiatives in the late of 70s, in 1978 after going through a series of excruciatingly rigorous National Examinations and Screenings, Dr Liu was selected by the Chinese Government to join the first handful of Chinese postgraduate students to study Aerospace Science and Engineering in North America and Western Europe. He was fortunate to have studied at the world leading school, the Institute for Aerospace Studies (UTIAS), The University of Toronto, Ontario, Canada.

Dr Liu was a Senior/Principal systems engineer in electronics and communications industry in China and Canada. Ever since the mid 1970s he participated or led the following major research and development projects: China's first generation of inertial guidance systems for navigation of missiles and aircraft; Channel equalization schemes in wireless and mobile communications; Code Division Multiplex Access (CDMA) coding scheme initiatives (written in C programming language), which was supported in part by the Canadian Government; Wireless data communications, in particular, for mobile office scenarios; and Internet/Intranet wireless data communications in enterprises.

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