



Department of Computing SEMINAR

Information Fusion in Content-based Retrieval from Large Multimedia Databases

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Abstract

The retrieval of information from large multimedia databases is a challenging problem because of the number of different concepts that may be of interest to the user and the multifaceted characteristics of each concept. The concept properties may span different sensing modalities and within each modality call for the use of a diverse set of features. Commonly, the retrieval problem is formulated as a detection problem (a two class pattern recognition problem), whereby the content of interest is looked for in the multimedia material and discriminated from the anti-concept class. The detectors are designed to capture the different manifestations of each concept class (colour, texture, shape, sounds).

The nature of the retrieval problem raises issues in information fusion. Both, feature level and decision level fusion provide useful mechanisms for tackling different aspects of the concept detector design process. At the feature level, the fusion is often accomplished with multi-kernel machine learning methods. The key question in this approach is how to weigh the contributions of the respective kernels. The weight allocation is normally controlled by regularisation. We discuss the effect of different norms on weight assignment. The findings lead to a two-stage machine learning strategy where the first stage serves simply as a means to eliminate non informative kernels.

The techniques discussed are evaluated on standard benchmark databases, including PASCAL VOC 08 image data set and Mediamill Challenge video database, based on the NIST TRECVID 2005 benchmark. The performance is measured using average precision that combines precision and recall into one performance figure. The benefits of various fusion mechanisms are demonstrated.

About the Speaker

Professor Josef Kittler is a Distinguished Professor at the University of Surrey. He has worked on various theoretical aspects of Pattern Recognition, Image Analysis and Computer Vision, and on many applications including System Identification, Automatic Inspection, ECG diagnosis, Mammographic Image Interpretation, Remote Sensing, Robotics, Speech Recognition, Character Recognition and Document Processing, Image Coding, Biometrics, Image and Video Database Retrieval, and Surveillance. Contributions to statistical pattern recognition include k-nearest neighbour methods of pattern classification, feature selection, contextual classification, probabilistic relaxation and most recently to multiple expert fusion. In computer vision his major contributions include robust statistical methods for shape analysis and detection, motion estimation and segmentation, and image segmentation by thresholding and edge detection. He has co-authored a book with the title 'Pattern Recognition: a statistical approach' published by Prentice-Hall and published more than 500 papers.

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Geology Seminar Room (312:222)

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