香港浸會大學理學院
HKBU Faculty of Science

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DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

PhD Candidate:	Mr Chang LIU
Supervisor:	Prof Pong Chi YUEN
External Examiner:	Prof Hong YAN Dr Kenneth LAM
Time:	15 January 2010 (Friday) 9:30 am – 11:30 am (35 mins presentation and 15 mins Q & A)
Venue:	T716, Cha Chi Ming Science Tower, HSH Campus

"Human Motion Detection and Action Recognition"

Abstract

Human action analysis has been received increasing attentions from researchers in the last decade. The objective of human action analysis is to detect and recognize human actions from videos so that the computer system is able to understand human behaviors and make further semantic description of the scene. This thesis proposes to employ the visual saliency for human motion detection via direct analysis from videos. Object saliency is represented by an Information Saliency Map (ISM), which is calculated from spatio-temporal volumes. Both spatial saliency and temporal saliency are calculated and a dynamic fusion method is developed for incorporation. The ISM is then used for measuring visual saliency and detecting foreground objects.

We explore the use of ISM for human action recognition. A Boosting EigenAction algorithm is proposed to recognize human action from video. A human action is segmented into a set of primitive periodic motion cycles from information saliency curve. Each cycle of motion is represented by a Saliency Action Unit (SAU), which is used to determine the EigenAction using principle component analysis. A human action classifier is developed using multi-class Adaboost algorithm with Bayesian hypothesis as the weak classifier. Given a human action video sequence, the proposed method effectively and efficiently locates the SAU(s) in the video, trains an action classifier, and recognizes the human actions by categorizing these SAU(s).

We develop a semi-supervised algorithm for human action recognition, as labeled data are costly to obtain whereas unlabeled data are abundantly available. A boosted Co-Training algorithm for human action recognition is proposed. Two confidence measures namely inter-view confidence and intra-view confidence are proposed and estimated to solve the two main problems in the Co-Training method, namely view dependency and view insufficiency, and are dynamically fused into one semi-supervised learning process. Mutual information measure is employed to quantify the inter-view uncertainty and measure the independence among respective views. Intra-view confidence is estimated from boosted hypotheses to measure the total data inconsistency among labeled data and unlabeled data. Two discriminative views from temporal and spatial information of the video, namely action saliency view and action eigen-projection view, are proposed as input data in practice. The proposed methods have been extensively evaluated using publicly available databases. Comparison between the proposed methods and existing state-of-the-art methods are also reported in this thesis.

***** ALL INTERESTED ARE WELCOME *****