

NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

PH.D DEFENCE - PUBLIC SEMINAR

Title: **Resource aware selection of user generated content in constrained mobile networks**

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Abstract:

Increasing sophistication of on-board sensors and computing capabilities available in mobile devices and their proliferation, has made them an important platform for content generation.

Such, User Generated Content

(UGC) from mobile devices, enriched with descriptive meta-information is gaining significance for its in-situ value in ad-hoc events which have little or no infrastructure. User experience of people attending such events is enhanced if the generated UGC can be disseminated in the vicinity of an event even as it is happening. But, smartphone battery constraints and bandwidth limits due to scalability issues of wide-area networking technologies, in supporting UGC traffic load, adversely affect content sharing.

Existing research in UGC sharing is mainly focused on processing the content and enriching its description with the sensor data, while, the effort required to retrieve the content is not considered as part of the problem, while techniques which reduce the load on 3G/HSDPA are agnostic to the multi-faceted characteristics of UGC.

The contributions of our work includes the design and development of three techniques to effectively bridge the gap between UGC and resource, by considering the subjective (such as user feedback) or objective (sensory data, spatio-temporal conditions) content characteristics of UGC and resource availability of the network, in "selecting" the UGC that satisfies the needs of consumers. They are:

(i) CoFiGel (Collaborative Filtering Gel) proposes the use of mobile-to-mobile (m2m) communication to share content among nearby event attendees to address bandwidth issues in wide-area networks. Due to limited mobile-to-mobile contact capacity caused by mobility, a recommendation algorithm, such as collaborative filtering (CF), is needed to transmit only content of potential interest to consumers. Information needed for CF to predict user interest is centrally located in connected networks. But, in distributed m2m networks, this information depends on content delivery. CoFiGel addresses the following question: under limited bandwidth, which content should be transmitted to which user so as to increase

positive user-content rating, while improving both the prediction coverage and precision of the CF algorithm.

(ii) Movisode (MOBILE VIDEO SHARING ON-DEMAND) proposes pull-based, on-demand mobile video sharing that selects videos from multiple sources in response to user requests for video segments matching certain spatial and temporal features. The selection is done by factoring in the upload cost of the videos. Movisode uses a lightweight video indexing mechanism that runs on mobile phones to annotate videos with temporal and spatial features that include sensor (compass) readings and point-of-interest (POI) of the content. Movisode component on server receives these indices and selects a set of videos in response to user queries considering both accuracy of the retrieved video and upload cost of the mobile devices.

(iii) AutoLink (Automatic Image Linker) addresses the problem of organizing smartphone images generated in ad-hoc events, which is characterized by diverse views, occlusion, abnormal lighting effects. It uses spatial features from sensors and content features to automatically generate content-based links between images efficiently, such that users could navigate between high context images to high detail.

Performance evaluation of the above techniques has demonstrated significant savings in resources, while achieving effective UGC sharing when subjective feedback, objective features and resource availability are combined to make content selection. The study reveals new research avenues to improve the performance of UGC selection, and extend it to novel applications that use UGC to provide better user experience.