MediaServ: Resource Optimization in Subscription based Media Crowdsourcing

Minhajul Bashir, A.S.M Rizvi and Shamir Ahmed

I. Introduction

- Crowdsourcing is the process of acquiring information/content from mass people.
- We introduce subscription based media crowdsourcing where users share photos only to specific (pre-registered) services.
- Transfer of media contents through Internet is resource consuming.
- In this thesis, we propose resource optimization for subscription based media content crowdsourcing. In this form of crowdsourcing, organizations (we refer to them as Campaigners) express their interest in user's media content, and media contents are transferred from registered user's device in a resource optimized and user friendly way.

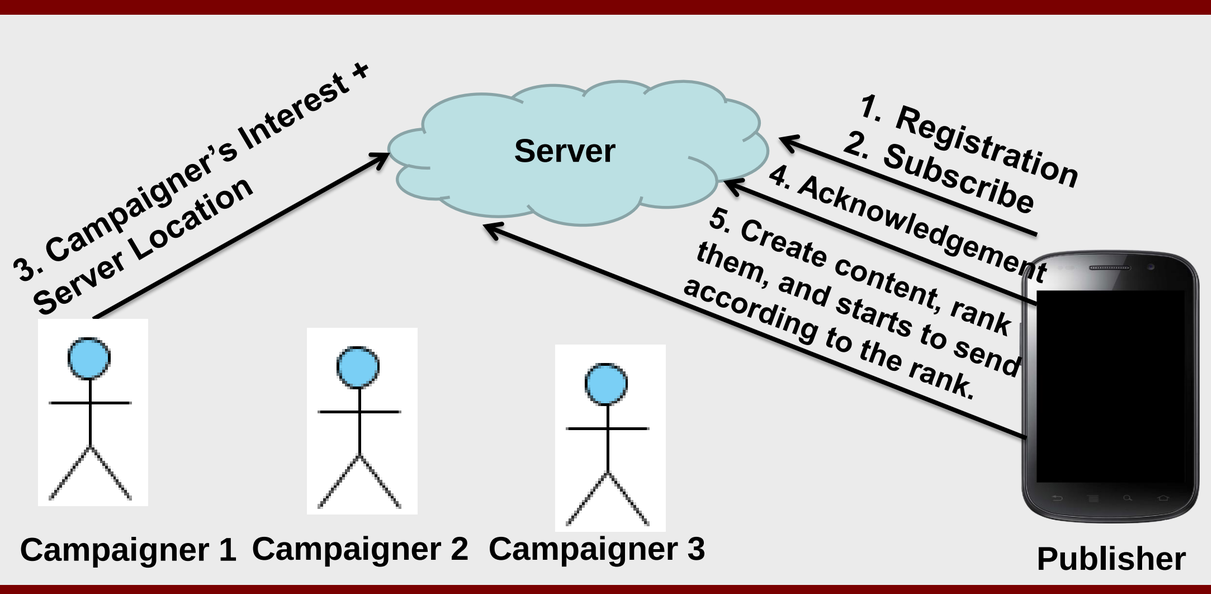
II. A few Application Cases

- Photo sharing for specific purposes is not uncommon. For example, mobile app Figure1 allows medical doctors to share photos relevant to certain medical cases for other doctors to comment. Another platform can acquire photos for tourism purposes.
- Photo sharing can be against sudden need. Suppose a child is lost in a large fair. Parents can ask people to share photos taken in fair in the hope that one of them may contain the child (thus may lead to last known location and time, etc).
- Suppose psychological researchers want to get statistics about people who take self image (aka. selfie). They may create a campaign and ask users to join the campaign (a selfie contest!).

III. System Component

- **Campaigners:** Campaigners seek photos among the subscribed users. Services are initiated by campaigners, and people are invited to subscribe to services. User benefits or incentives may be announced by the campaigners. They define server address and service requirement of the photos that they want.
- **Publishers:** People constantly capture photos. These photos may be important for many campaigners. These photos can be published by the users. Contrary to the traditional concept, now the common users are the publishers.
- **Interests:** Campaigners may publish their own interest. They can use the media contents published by the publishers for their own interests. Publishers may make deal with the campaigners for incentives or they can do social works through this system.

IV. System Flow



V. Content Arrival and Queue Generation

- After the capture of each photo, the system calculates a *score* based on the following parameters. The score measures how much the photo satisfies the requirement of a certain campaign.
- **Date and Time:** Date and time is required for evaluating a content for a service. There may be a range or fixed value for date and time. Contents which satisfy the condition have a higher evaluation value for that service.
- **Location:** Location can be obtained through GPS system if the user is in any network. Otherwise manual location input system is also available.
- **Image Features:** Though image processing is resource consuming, we have implemented histogram pattern to ensure a particular RGB value is present in the image and implemented face detection to ensure faces are present in the image which may be important for some services.
- **User Evaluation:** After capturing a photo user can give the attributes of the photo. User can select the services for which this content is eligible.
- After combining all the above values we generate score for each content and the photos are kept in a priority queue based on their scores.
- **Priority of the Services:** Different services may have different priorities which can be defined from the server side or by the publisher. This priority has a weighted impact on the overall transmission.

VI. Resource Optimization for Content Delivery

Not all campaigns have the same value, so they can be prioritized. Not all photos serve a campaign equally, so they have scores. Depending on this, under a given bandwidth constraint, we attempt to choose (subset) of photos that maximize overall utility, expressed by the following formulation:

$$\text{maximize } \sum_i \sum_j x_{ij} \times p(j) \times \psi(i,j) \dots (1)$$

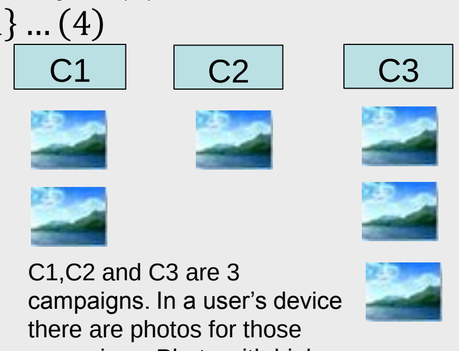
subject to:

$$\sum_i \sum_j x_{ij} \times sz(i) \leq B \dots (2)$$

$$\psi(i,j) \geq \tau(j), \forall i,j \dots (3)$$

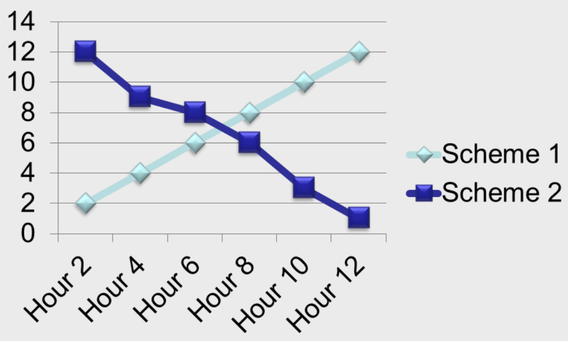
$$x_{ij} \in \{0,1\} \dots (4)$$

Where, In (1), x_{ij} is a binary value which is 1 if content i is to deliver to service j, and 0 otherwise. Here, $p(j)$ denotes the priority of service j, $\psi(i,j)$ is the evaluation function that returns the eligibility of content $c_i$to requirement r_j. In the constraints part (2), $sz(i)$ denotes the size of content i, B is the user defined maximum bandwidth. This constraint is to limit the maximum bandwidth defined by the user. The constraint (3) restricts a user to deliver low matching content. The control parameter $\tau(j)$ can be set by the user or by the service providers



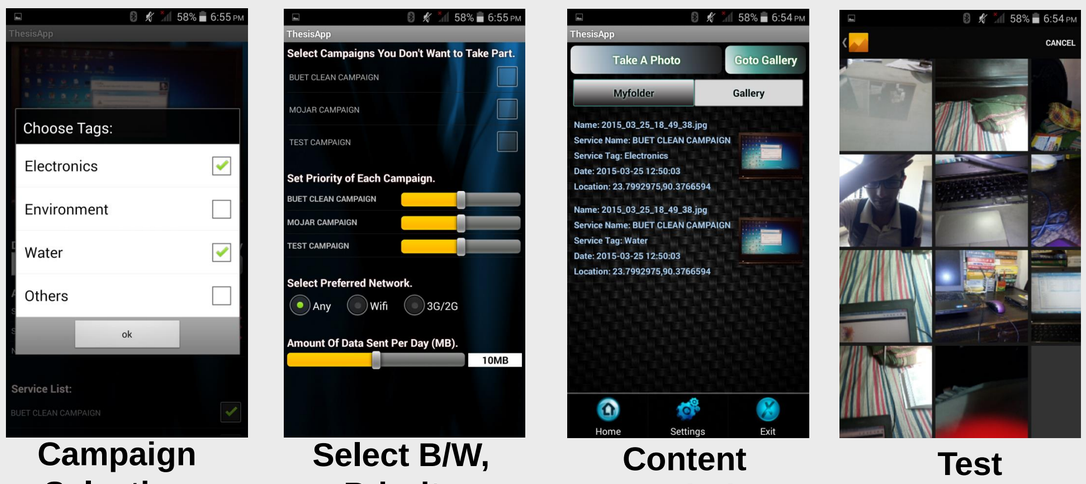
C1,C2 and C3 are 3 campaigns. In a user's device there are photos for those campaigns. Photo with higher value will transmit first.

VII. Bandwidth (B) Allocation



User can determine the total size of data (B of Eq-2) that may be sent within several hours. The graph on left illustrates a situation where a user allocates 12MB of data to be sent within 12 hours. We consider two types of budget specification: hourly budget (incremental accumulate) or as-a-full-chunk (incremental deplete).

VIII. Application



Campaign Selection | Select B/W, Priority | Content Description | Test Contents

IX. Conclusion and Future Work

- We developed a demo application which develops a relation between campaigners and publishers in a resource optimized way.
- We are trying to develop a more user friendly interface so that the app learns the user's behavior and provide suggestion accordingly. After observing a few initial associations, the app may automatically suggest corresponding campaign for a photo based on the context when the photo is taken.
- Image processing in a resource optimized way has to be implemented in the system.
- Incentive planning for publishers should be investigated so that the publisher are interested to publish their photo.
- A website containing the publisher's photo may be included.
- Energy consumption of user's device should be investigated.

Department of Computer Science and Engineering (CSE), BUET