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EVOLUTION OF CROWD-SOURCING FROM COMPUTER TO MOBILE SYSTEMS

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Abstract: As crowd-sourcing is becoming popular for problem solving and completing a task, it is now very important to use this concept in an advance manner. It can also be used as a distributed and vast source of information. This concept is now evolving in world of mobile systems. This will be a little different from that of computer systems. In this paper, we have discussed some new technologies and challenges before us to implement these advancements in crowd-sourcing. We are going to talk about cheat-detection techniques, handling multimedia databases and how to trade off between cost and accuracy by considering the redundant data as well.

Keywords: crowd-sourcing, cheat-detection, multimedia database.

1. INTRODUCTION

With the exponential growth of internet in recent years, the huge workspace and opportunities are developed. To meet this growth, a number of ways and techniques are acquired in last decade. Crowd-sourcing is one of the most famous and effective approach to meet the desired rate of internet growth. Crowdsourcing was introduced in 2006, by Jeff Howe. Basically, crowdsourcing is a blend of “crowd” and “outsourcing”. It can be explained philosophically as “borrowing brain from the crowd”. The term can be defined as “the act of getting a job from a professional agent and passing it(outsourcing) on to a large group of people(crowd)”. An important difference is that the entrepreneur doesn’t know who has completed his task. The people from crowd don’t form any group. They are anonymous members of a crowd. Another big difference is that in traditional outsourcing approach, the worked is assigned a task but in crowdsourcing, worker gets to choose on which task he wants to work on. Crowdsourcing approach was successfully used commercially in Murk or Microworkers. By commercial use of crowdsourcing, work can be done at a great pace by distributing it to a large group. But, the results may not be very reliable.

Now, with the high usage of advanced mobile systems, such as tablets and smart phones, a large set of information, it can be users information or the activities log etc are available. This information can be analyzed or measured by mobile device itself or can be passed to a dedicated mechanism depending upon the user preferences. CrowdSourcing has brought a big change in problem solving mechanism in world of computers and now it has started changing the use of mobile devices and invented a new dimension of analyzing the patterns of mobility, log of activities etc.

2. BACKGROUND AND RELATED WORK

In this section, we will discuss about the research work and projects which has been based on idea of crowdsourcing. As the concept of crowdsourcing is introduced in last decade only, there are very few successful and big projects which were successful. Crowdsourcing in the world of mobile is even more recent idea and is only implemented on very few ideas. We are going to discuss some of these, both crowdsourcing on computer system and on mobile system, ideas and projects which were implemented and were successful.

2.1 MTurk Platform

Amazon Mechanical Turk was launched in 2005 end and is in beta phase in 2011 December. Mturk differentiates between two kinds of roles in this mechanism. There are two accounts maintained. One is for the Requesters, who submits a task and other one is Workers, who works on those tasks. These tasks are called *Human Intelligence Tasks* (HIT). Workers choose an appropriate task and locks the particular HIT for himself. Once a HIT is locked for a worker, it cannot be assigned or locked by any other worker. Each HIT is paid in range of \$0.01 to few

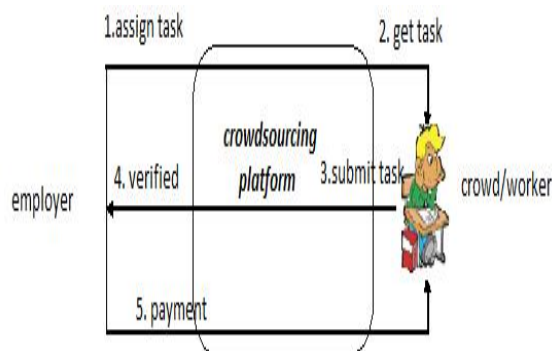


Figure 1

dollars. This amount depends upon the difficulty level and time completion of that HIT.

2.2 Microworkers Platform

This platform was launched in 2009 and is similar to Mturk. There are some minute differences in this platform. One is that in Microworkers, all the users have only one account and with one account, the user can login as both *employer* and *worker*. No US based accounts are needed to get payments as the payment service is online and is done through various online payment mechanisms like *PayPal*. This gives an inspiration for international user to work on this platform. Similar to Mturk's HIT, Microworkers has *jobs* and *campaigns*. In contrast to Mturk, in Microworkers jobs are predefined into different categories with different pay scheme depending upon the time consumption and complexity. Jobs are paid in range of 0.10 to few dollars.

2.3 Mobile Image Search

A study survey was done in Japan based on the concept of crowd-sourcing. They developed a mobile social search application. With the assistance of local people or crowd via social mediums, the application helps foreigners in Japan by replying their image based queries in a timely fashion. They ran a field practical for 45 days with over 50 participants and found that the mobile crowdsourcing model result in a reliable performance in terms of response speed and quantity. 50% of all the requests were answered within 10mins and 75% were answered in 30 mins and on an average every query had 4.2 replies.

This kind of application is very useful for tourists and travelers who are not able to understand of local language of a city. Ordinary digital translators may not be useful in this case because the user is unable to input the alphabets/words of the language they see for e.g. Chinese or Japanese language. Image based text translation systems were developed but haven't yet proved very useful for the purpose. To resolve this problem, UbiAsk[3] a social media based crowdsourcing application built on networking infrastructure. Instead of using machine algorithms, use of power of general crowd in cloud via social means to solve typical computational problems like image recognition and translation of text were implemented. To evaluate this system, a controlled experiment was conducted. In this experiment, main focus was on quantity and response time.

2.4 Txteagle

It is a system which enables ordinary people to earn a little income in terms of money by completing tasks on cell phones for a employer who pays them either mobile money or air time.

This system was launched in Kenya and Rwanda. Collaboration was made with the cell phone service providers. The tasks were translation, survey and transcription. This study was done by including high school students, local security guards and taxi drivers of Nairobi.

In contrast of other services like Mturk, which are passive, Txteagle[5] service is active in behavior. This system is built to actively select the fit task for the user. The task difficulty for a particular user is customized. The user's response to a task derives the system to learn the areas in which the user is interested and expert. This helps the user to assign the right task to right user.

3. TOWARDS MOBILE IMPLEMENTATION

Web crowdsourcing markets are very unlikely to accessible by workers who are considered as economically poor or those who are residing at lower level of economic pyramid. Also, those who are illiterate in field of computer education are unaware of even this crowdsourcing term. Many big firms and industries have understood this and now they are shifting their focus towards mobile implementation of crowdsourcing.

3.1 Motivation

Many people in all over the world have limited English literacy and accessibility of desktop is not that easy for most of the peoples. This makes a big part of crowd unable to participate in crowdsourcing. In contrast to this, cell phone penetration is very high. In india alone, the percentage of mobile users is much higher than that of desktop users. Many of the mobiles are simple phones having a simple and common feature of accessing the web. Also, the cost of internet on mobile phone is well affordable. This makes the mobile internet a cost effective approach to perform crowdsourcing upon.

3.2 Challenges

Mobile systems are very different from computers. Although they are considered as compact form of computer systems now a days, but still there are some major differences which cannot be ignored while talking about the implementation of crowdsourcing on mobile systems.

The browsers of mobile phones are very much less capable if compared to that of a computer's browser. And also, the capabilities of these browsers vary from phone to phone.

Besides the limitation of a mobile phone, crowdsourcing itself has some challenges which need to be deal with. We are discussing some major difficulties to well implement the crowd-sourcing approach to a widespread level.

- Cheat Detection

Crowdsourcing is attractive because it is scalable, cheap and gives us easy access to information that would be very expensive or difficult to collect. And, as crowd-sourced systems are now becoming an important part of computer world, they will definitely become targets for malice and mischief.

Even if the user or worker doesn't intend to cheat, wrong solution or information can be submitted by mistake. These cases are also needed to be taken care of. So in general manner, we can say that some users submit wrong results to get more income and others make mistake unintentionally. Here, we will denote them both as cheaters. Sometimes small mistake in results of a worker or user can be tolerated as it may not cause big problem to our overall solution, but sometimes it is very important to get accurate response. Some general solutions have been discussed in past. Two easy to understand and simple methods are "The majority decision approach" [5] and "The control group approach" [5]. These methods are suitable for the cases in which many users are submitting the answer of same problem and the answer is accurate and does not vary people to people.

There are some other cases where solutions or answers may vary user to user. These cases are very difficult to monitor. It is not easy to say that the user is submitting answers responsibly or he is just answering vaguely to maximize his income. In these cases, the work or questions may be repeated after a while. This will record the behavior of the user that he is submitting the same answer to that question each and every time or not. This will reveal the nature of response of the user.

- Mu006Ctimedia Database Management

It has been problematic technically to interoperate multimedia files, which includes the use of various formats for same data, of different data models and transaction processing methods. These all problems lead to what generally known as representational heterogeneity. Sometimes these issues are handled separately for different types of file systems. A uniform data system *extensible Meta system M(DM)* [6] were proposed. In this system, the definitions of database schemas, database models can be handled uniformly.

Another approach was proposed for audio files. The spectral properties of files of audio formats were analyzed and the acoustic features which were based on spectral properties were proposed and harmonic enhancement was used to classify

audio. This was known as multi model HMM [7].

Another recent open source database for mobile devices was introduced which is known as WURFL [8]. It maps a cell phone to its capabilities. It makes easy to take http request and recognize whether it comes from the corresponding mobile browser without maintaining huge list of user agents of mobile browsers.

- Handling Ambiguity

Recognition technologies like gesture, handwriting and speech recognition techniques have made a huge workspace in recent years. More support for natural forms of communication and recognition can make a computer more like human expert. It will become more accessible. These natural interfaces are used generally where mouse and keyboard are not available. However, these recognizers can generate errors as these are error prone. The user's intention of input can be different from what is understood by recognizer. This can cause problems in terms of performances and confusion of user and also it will result in uncertain interactive statements. Architecture [9] was designed to handle such kind of ambiguities.

4. CONCLUSION AND FUTURE WORK

The impact of mobile phones can be seen in all over the world. Mobile phones now work as a fundamental tool to billion of peoples. The reduction in the price of these phones has brought an exponential increase in no. of human beings depending upon this device to perform their routine jobs. So, going with the flow, the industrial minds have also started implementing one of the most powerful source i.e. crowd source on mobile phones. But, as compared to web crowdsourcing, mobile system based crowdsourcing has yet to face many challenges and there is a huge scope of taking this approach to a higher level. Instead of all these challenges, the crowdsourcing on mobile phones has a great future ahead. This can be easily seen as the mobile phones are continuously increasing, concept of cloud computing is getting bigger.

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