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A SURVEY ON MULTI SKILL ORIENTED SPATIAL CROWDSOURCING

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ABSTRACT

Now a day there is fast development in smartphone devices with crowd sourcing platforms, Attention from the database community towards spatial crowdsourcing is more. Particularly, the spatial crowd sourcing sending requests to worker for their tasks using their current live positions. In this overall system, Admin have to take part and assume a spatial crowd sourcing system and each worker have some special qualified set of skills for spatial task like building a house, painting a wall, roof, and performing live shows for an events which is having limited constrained i.e. time and budget and qualified skill set. In this system, we are going to study and provide solution to the problem of multi-skill spatial crowd sourcing (MS-SC), In this it will finds an important beneficial solution to worker and task assignment methodology, so that we are able to match the skills of worker with the user defined tasks. By using this approach workers as well as task user will get more benefits which is maximized with budget constraint. Hence, we are going to prove that this problem is NP-hard. So that we will propose a system or we are providing solution to the given problem with three effective approaches, with greedy, g-divide and conquer and cost-model-based adaptive algorithms to assign qualified skilled worker for user task which is beneficial for workers as well as crowds. Through this extensive experiments with crowds and worker dataset which includes there whole information i.e. skill set with respected worker and crowd with their profile, so we are going to give the efficient and effective solution to our given problem for that we will use real as well as synthetic datasets .

Keyword: - *Multi Skill Spatial Crowdsourcing, greedy algorithm, g-divide-and-conquer algorithm, cost-model-based adaptive algorithm.*

1. INTRODUCTION

To partake in some location based tasks which are nearer to the workers current location or to accomplish such tasks like clicking photos ,making video, repairing or building houses, etc., at some spatial locations people can make use of some GPS equipped mobile phone devices and some mobile networks. Recently, some new framework introduced viz spatial crowdsourcing, for managing workers to conduct their spatial tasks [1], TaskRabbit [11]. Spatial crowdsourcing platform such as gMission [4] and MediaQ in that it allocate number of flexible workers to accomplish tasks available nearby, for this requirement is workers have to physically switch from one location to another allocated locations to complete these spatial task. Here, in this not all spatial tasks are easier as that of clicking a photo etc. This task can be easily completed via camera or using smartphones. As compare to this there are some spatial tasks or an event, which may require some demanding qualified skilled workers.

2. LITERATURE SURVEY

Crowdsourcing is a platform which is mostly used for many human related tasks, like understanding natural languages, predications related to market etc. Meanwhile, with improvement in comprehensive technology, smartphone devices become more popular. These devices make use of sensors to assemble data like multimedia data and information about location. This will make us possible to derive the new kind of system for crowdsourcing mode i.e. spatial crowdsourcing. In this system a user will ask or post their request for resources or task related to his specific location. Then the workers or users who want to take that task through admin they have to travel to that location and get the confirmation about task. Because of the development in technology spatial crowdsourcing become more popular than general crowdsourcing. After studying and analyzing the previous systems we are going to designed a mechanisms that can be used to motivate smartphone users to take part in smart phone sensing, which is a new sensing paradigm which allow us to organize and analyze sensed data far beyond the region [1] . We are going to considered two different models from different perspectives: the platform centric model and user centric model. We are going to assess how this idea of user generated content, crowdsourcing which is web based, and smart devices, it will combine to extend crowdsourcing across the digital domain and build the link of task with real world. To enlarge our idea we will implement a crowdsourcing scenario for example in that it will take location as a parameter (longitude and latitude) for separating tasks among workers [2].we will implement such a concept and a platform and will discuss about the results of this user studies. From the previous system we found that most of the time worker prefer nearer task rather than pulling task they pushed that task.

2.1 Z. Chen, R. Fu, Z. Zhao, Z. Liu, L. Xia, L. Chen, P. Cheng, C. C.Cao, and Y. Tong [4]

This author presents a mechanism i.e. 'gMission'. It provides a base for performing multiple crowdsourcing tasks using location information. Multiple techniques implemented like task assignment and answer aggregation. Kazemi and Shahabi proposed some similar work. As compared to that for effective results spatial crowdsourcing gMission performs operation on multiple techniques.

2.2 F. Alt, A. S. Shirazi, A. Schmidt, U. Kramer and Z. Nawaz [2]

They have studied how crowdsourcing can be extended beyond the digital domain. Based on a discussion of different approaches for content generation, that is explicitly and implicitly, they proposed an approach for location-based crowdsourcing. System by this gives a platform for searching a task and provides a solution to that task.

2.3 C. Cornelius, A. Kapadia, D. Kotz, D. Peebles, and M. Shin[6]

In this they make use of sensor data from individual mobile device, then the set of mobile nodes can accept that tasks and feedback their reports. They evaluated this system using ObjectFinder and RogueFinder, and results shows the results.

2.4 P. Cheng, X. Lian, Z. Chen, R. Fu, L. Chen, J. Han, and J. Zhao[5]

In this they provide a solution to the problem of reliable diversity based on spatial crowdsourcing (RDB-SC) using time constraint for that spatial task present in real as well as synthetic dataset so that tasks can be completed with high reliability..

3. SYSTEM OVERVIEW

In this system for Task assignment on multi skill oriented spatial crowdsourcing, more specially following steps are performed:

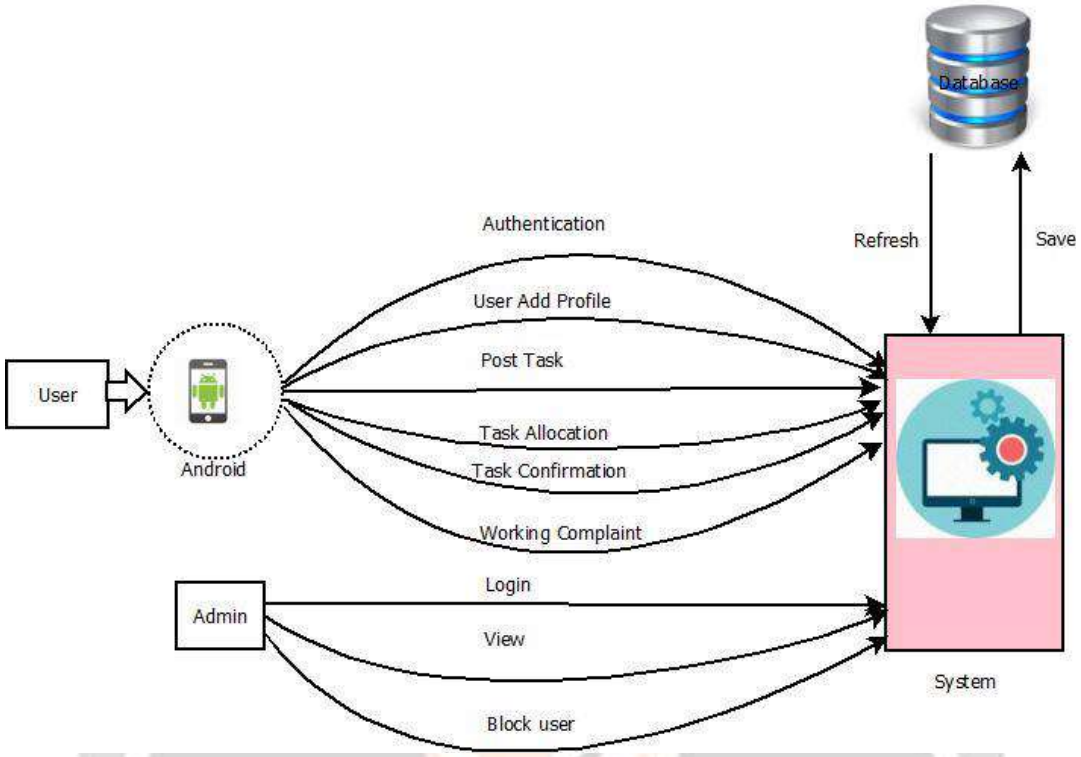

Fig -1: System Architecture

Every user and worker must have to register with their proper attributes and skills and details about task. After that user can login and post their task and requirements, worker will apply and then according to skills and requirements admin will allocate workers to specified tasks. Using an Android application with its parameters the location and their task preference every user will be allocated with their task. Hence a kind of distance calculation mechanism will be used to connect with in the location and get the suitable user who can take the task and work on it effectively. Distance algorithm like dijkstra's or google maps will be used to make it more accurate.

System uses three algorithms:

3.1 Greedy algorithm

The greedy algorithm finds one worker with highest score for task assignment. We will show the procedure of an algorithm:

Procedure MS-SC_Greedy {

Input: n workers in W_p and m time-constrained spatial tasks in T_p

Output: a worker and task assignment instance set, I_p

1. $I_p = \phi$
2. Compute all valid worker and task pairs (w_i, t_j) from W_p and T_p
3. While $W_p \neq \phi$ and $T_p \neq \phi$
4. $S_{cand} = \phi$;
5. For each task $t_j \in T_p$
6. for each worker w_i in the valid pair (w_i, t_j)
7. if we cannot prune dominated worker w_i by Lemma 2
8. if we cannot prune high – wage worker w_i by Lemma 3
9. add (w_i, t_j) to S_{cand}
10. if we cannot prune the task t_j w.r.t. workers in S_{cand} by Lemma 4
11. for each pair w.r.t. task t_j in S_{cand}
12. compute the score increase, $\Delta S_p(w_i, t_j)$

13. else
14. $T_p = T_p - \{ t_j \}$
15. Obtain a pair, $(w_r, t_j) \epsilon S_{cand}$,with the highest score increase,$\Delta S_p(w_r, t_j)$, and add this pair to I_p
16. $W_p = W_p - \{w_r\}$
17. Return I_p

}

3.2 g-divide-and-conquer algorithm

In this algorithm it recursively divides the original problem into sub problems and gives solution to each sub problem and then merge that solution by resolving conflicts. The algorithm is as shown below:

Procedure MS-SC_gD&C {

Input: n workers in W_p and m time-constrained spatial tasks in T_p

Output: a worker and task assignment instance set, I_p

1. $I_p = \phi$
2. Estimate the best number of groups , g, for W_p and T_p
3. invoke MS-SC_Decomposition (W_p, T_p, g) and obtain subproblems P_s
4. for s = 1 to g
5. if the number of tasks in subproblem P_s (group size) is greater than 1
6. $I_p^{(*)}$ = MS-SC_gD&C $(W_p(P_s), T_p(P_s))$
7. else
8. invoke classical greedy set cover algorithm to solve subproblem P_s and obtain assignment results $I_p^{(*)}$
9. for i= 1 to g
10. find the next subproblem, P_s
11. Ip = MS-SC_Conflict_Reconcile $(I_p, Ip^{(*)})$
12. Return I_p

}

3.3 cost model based adaptive algorithms

Until the size of task group become one, till this algorithm will not divide the problem into sub problem like previous one. Algorithm for this procedure is as shown below:

Procedure MS-SC_Adaptive {

Input: n workers in W_p and m time-constrained spatial tasks in T_p

Output: a worker and task assignment instance set, I_p

1. $I_p = \phi$
2. estimate the cost, $cost_{greedy}$,of the greedy algorithm
3. estimate the best number of groups,g, and obtain the cost ,$cost_{gdc}$,of the g-D&C approach
4. if $cost_{greedy} < cost_{gdc}$
5. I_p =MS-SC_Greedy(W_p, T_p)
6. else // g-D&C algorithm
7. invoke MS-SC_Decomposition (W_p, T_p, g) and obtain the subproblems P_s
8. for each subproblem, P_s
9. $I_p^{(*)}$ = MS-SC_Adaptive $(W_p(P_s), T_p(P_s))$

10. For i=1 to g
11. Find the next subproblem,P_s
12. I_p =MS-SC_Conflict_Reconcile (I_p, $I_p^{(*)}$)
13. Return I_p

}

The following phases or modules are required for above solution:

- **Dataset Collection:** It includes all information about worker and user who's having some task with their relative attributes.

- **Authentication (Android):** Every user in the application has to register themselves so that they can use their credentials to login into it. During login the password is verified from server side and hence only valid user can login into the application.

- **Add Profile:** One they login into the application they have to update their profile in complete way along with their professional working data. They also select the field of the working category which helps the application to select user based on the task.

- **Post Task:** Every user has the ability in the application to post any specific work on any location as per their requirement. These data are captured from the user and it's been used for processing in the server side.

- **Task Allocation:** As the complete working of the application is on android device, based on the location we get to know the person available within that location or the nearest person located in that location with skill set of same work category as required in there.

- **Task Confirmation:** Once the user is found then the user gets a notification in the application to accept the task request. After the acceptance task person is decided and the details are shared so that they can further go ahead.

- **Working Complain:** After the task, if the user is not satisfied or any one has any sort of complaint then they can feed in the compliant inside the application along with the task person name.

- **Admin View:** Admin can login from their web server and can view all the user looking for their task to be done and who is been allocated to whom. Also if any user gets a work complain of more than five times then that user is reflected in the admin side and then admin can block that user so that user can't login into the system again.

4. CONCLUSIONS

System will provide a solution to the problem of the Multi Skill Oriented Spatial Crowd sourcing, in which system going to assigns some constrained to flexible workers, so that the skills of that worker will apply on the present task. This task can be covered by skill set of workers so that the task assignment score with worker skill is maximized by using the heuristic approaches that are the algorithm which we are going to implement in this system .So that this system will gives us a skilled worker set for an appropriate task with user requirement with time constrained as well as budget constraints, so that user can further choose the skilled worker for their task by their score.

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6. REFERENCES

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[8] http://arxiv.org/abs/1510.03149.

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[9] Foursquare. https://foursquare.com.

The Foursquare app helps you discover new places, with recommendations from a community you trust. Find a better experience, anywhere in the world.

[10] Google street view. https://www.google.com/maps/views/streetview.

It gives location of user .

[11] Taskrabbit. https://www.taskrabbit.com.

TaskRabbit is an online and mobile marketplace that matches freelance labor with local demand, allowing consumers to find immediate help with everyday tasks, including cleaning, moving, delivery and handyman work.

[12] Waze. https://www.waze.com.

Waze is all about contributing to the 'common good' out there on the road.