Social Recruiter: Dynamic Incentive Mechanism for Mobile Crowd Sourcing Worker Recruitment with Social Networks

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Abstract - Worker Reclamation is an important problem in mobile crowdsourcing(hosts), which aims to find sufficient and suitable actors to perform tasks we concentrate on the inadequate participation problem of hosts systems with limited number of workers, and propose to influence social network to retain workers for task completion as well as expanding the worker pool.

Index Terms - Audio Feature Extraction, Emotion Classification, Sentiment analysis, Speech signal processing .

INTRODUCTION

With the rise of mobile devices, Mobile Crowdsourcing (MCS) has emerged as a powerful way to complete large-scale tasks by leveraging contributions from everyday users. However, a key challenge lies in motivating enough users to participate, especially for new platforms with limited user bases. Traditional incentive mechanisms focus on selecting optimal participants but often overlook the cold-start problem. Recent approaches have turned to social networks to recruit users, though many raise privacy concerns or have limited outreach. To address these challenges, Social Recruiter is proposed — a dynamic incentive mechanism that encourages users to propagate and/or complete tasks by offering separate rewards for each. It avoids privacy issues by limiting recruitment to users who voluntarily join the MCS platform and dynamically adjusts rewards based on real-time participation, ensuring effective recruitment and task completion.

PROBLEM DEFINITION :

The problem revolves around the challenge of efficiently recruiting mobile crowdsourcing workers using social networks while offering dynamic incentives.Traditional recruitment methods often fail to engage and retain workers effectively due to the lack of personalized, adaptive incentives.The dynamic nature of crowdsourcing requires real-time adjustments in recruitment strategies to attract qualified workers and maintain their motivation.

OBJECTIVE OF THE PROJECT :

To optimize the reclamation process in mobile crowdsourcing, using social networks offers a important strategy for expanding the worker pool efficiently. By enabling druggies to invite and motivate their peers, the platform can reach further actors and ameliorate overall task completion rates. A dynamic incitement design further enhances engagement by conforming prices grounded on real- time participation, icing a balanced approach between task propagation and fulfillment

SCOPE OF THE PROJECT:

This project focuses on designing and implementing SocialRecruiter, a dynamic incentive mechanism that harnesses social networks to optimize mobile crowdsourcing recruitment.This delineated scope ensures the project remains focused on expanding participation, incentivizing engagement, and respecting privacy—all while demonstrating performance improvements through dynamic, data-driven reward adjustments.

.I. LITERATURE SURVEY

AUTHOR: D. Yang, G. Xue, X. Fang, and J. Tang

Smartphones are equipped with affordable yet important detectors similar as accelerometers, gyroscopes, GPS, microphones, and cameras that enable large- scale environmental and exertion covering through crowdsensing. still, numerous being crowdsensing platforms struggle to attract sufficient stoner participation due to weak incitement schemes. To attack this, we propose two innovative incitement mechanisms a crowdsourcer- centric model grounded on a Stackelberg game, where the crowdsourcer acts as the leader and druggies as followers — reaching a

unique equilibrium that maximizes mileage; and a stoner-centric model exercising an transaction- driven medium that's effective, collectively rational, cost-effective, and veracious. expansive simulations validate both mechanisms, demonstrating theoretical soundness and practical performance advancements.

AUTHOR: R. K. Ganti, F. Ye, and H. Lei,

An emerging category of devices at the edge of the Internet are consumer-centric mobile sensing and computing devices, such as smartphones, music players, and in-vehicle sensors. These devices will fuel the evolution of the Internet of Things as they feed sensor data to the Internet at a societal scale. In this article, we examine a category of applications that we term mobile crowdsensing, where individuals with sensing and computing devices collectively share data and extract information to measure and map phenomena of common interest. We present a brief overview of existing mobile crowdsensing applications, explain their unique characteristics, illustrate various research challenges, and discuss possible solutions. Finally, we argue the need for a unified architecture and envision the requirements it must satisfy.

AUTHOR: L. G. Jaimes, I. J. Vergara-Laurens, and A. Raij,

Crowd sensing (CS) is an approach to collecting many samples of a phenomena of interest by distributing the sampling across a large number of individuals. While any one individual may not provide sufficient samples, aggregating samples across many individuals provides high-quality, high-coverage measurements of the phenomena. Thus, for participatory sensing to be successful, one must motivate a large number of individuals to participate. In this work, we review a variety of incentive mechanisms that motivate people to contribute to a CS effort. We then establish a set of design constraints or minimum requirements that any incentive mechanism for CS must have. These design constrains are then used as metrics to evaluate those approaches and determine their advantages and disadvantages. We also contribute a taxonomy of CS incentive mechanisms and show how current systems fit within this taxonomy. We conclude with the identification of new types of incentive mechanisms that require further investigation.

II. EXISTING SYSTEM

- Inspired by the succuss of the social network (e.g., Facebook, WeChat and Twitter, etc.) in recent years, some studies have proposed new incentive mechanisms to recruit workers with the assistance of social networks.
- This would raise privacy concerns for those users in social networks who are not interested in performing tasks as their profiles are drawn by the MCS platform.

III.DRAWBACKS OF EXISTING SYSTEM

- Insufficient Participation Problem

When too few users are active, tasks may remain uncompleted or suffer significant delays, undermining the system's usefulness. Low engagement can create a negative feedback loop—because few people participate, others won't join either. Over time, this hampers scale and limits the platform's effectiveness.

- Cold-Start Worker Recruitment Problem

New platforms struggle to attract their first batch of participants, lacking both reputation and credibility needed to draw users in. Without initial recruitment, it’s difficult to demonstrate value or momentum, which discourages adoption. This stagnation early on severely restricts early-stage growth.

- Data Security Risks

Crowdsourcing involves collecting sensitive data—like location, sensor readings, or personal input—which, if mishandled, poses privacy threats. Weak data security may lead to misuse or unauthorized access, eroding trust. Once trust is compromised, users are much less likely to participate.

- Quality Control Issues

Crowdsourced data can vary greatly in reliability and precision, as contributors may be unskilled, inattentive, or malicious. Inconsistent quality requires additional validation or filtering processes, increasing operational overhead. Poor data quality ultimately damages the integrity and value of the entire system.

IV. Algorithms

The proposed method uses a **Task-Specific Epidemic Model**, inspired by the **SIR (Susceptible-Infected-Recovered)** epidemic framework.

- Workers are modeled in states (idle, propagating, completing).
- Incentives are dynamically updated per cycle based on task progress.
- Balances rewards to encourage optimal task spread and fulfillment

Key Components and Functionality:

1. Task Requester
   - Functionality: Uploads tasks to the MCS (Mobile Crowdsourcing) platform.
   - Role: Initiates the crowdsourcing process by creating tasks and monitoring their progress.
2. MCS Platform
   - Functionality: Acts as the central system managing task distribution, user registration, reward allocation, and tracking.
   - Key Responsibilities:
     - Divides task duration into multiple cycles.
     - Dynamically adjusts propagating and completing rewards based on real-time user activity.
     - Ensures privacy by avoiding access to social profiles.
3. MCS Workers
   - Functionality: Registered users who participate in tasks.
   - Types of Actions:
     - Propagate Tasks: Share tasks within their social networks.
     - Complete Tasks: Submit responses or results to posted tasks.
   - Incentives: Earn separate rewards for propagation and completion, giving them flexibility.
4. Social Network Propagation
   - Functionality: Enables peer-to-peer task distribution without platform collaboration.
   - Purpose: Helps scale up the worker pool organically and solve the cold-start problem.
5. Dynamic Incentive Mechanism
   - Core Feature: Based on a task-specific epidemic model inspired by the SIR (Susceptible-Infected-Recovered) model.
   - Functionality:
     - Adjusts rewards during each cycle.
     - Balances between encouraging task spread and ensuring task completion.
     - Works within a budget constraint to maximize effectiveness.
6. Data Monitoring and Control
   - Functionality: Tracks user activity, task progress, and updates reward schemes accordingly.
   - Objective: Ensure efficient execution without overspending or quality loss.

Advantages of Project:

- Solves Cold-Start and Participation Issues
  Unlike traditional systems that rely on pre-existing user pools, SocialRecruiter encourages new user recruitment via peer-to-peer invitations. This helps platforms overcome the cold-start problem and continuously attract participants.
- Dual Incentive Model
  The system separates propagating rewards (for inviting others) and completion rewards (for finishing tasks), allowing users to contribute based on their preference or capability. This increases overall engagement and participation rates.
- Dynamic Reward Adjustment
  Rewards are not fixed. They are recalculated during each cycle based on real-time user activity. This avoids overpayment when participation is high and increases motivation when user involvement drops.
- Privacy-Preserving Design
  Unlike many systems that require access to users' social media profiles, SocialRecruiter does not collect personal data. Users participate voluntarily, which fosters trust and avoids privacy concerns.
- Scalable Recruitment Strategy
  As users propagate tasks through their own networks, the system experiences organic growth without needing administrative expansion. Each user effectively becomes a recruiter, scaling the platform naturally.
- Increased Task Completion Efficiency
  The dynamic incentives and network-based recruitment help ensure that tasks are not just shared widely but also completed promptly, improving turnaround time for requesters.
- Budget-FriendlyOperation
  The system is designed to operate within a defined budget. By using real-time feedback to adjust incentives, it maximizes task output per unit of financial resource without overspending.

- User Flexibility and Autonomy
  Users are not forced into rigid roles. They can choose to only propagate, only complete, or do both based on their convenience. This freedom promotes sustained engagement.

TABLE 1 KEY ALGORITHM

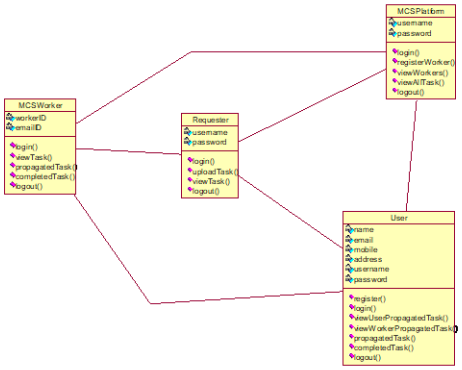
Component	Algorithm / Model Used	Purpose	Features	
Incentive Mechanism	Dynamic Multi-Cycle Incentive Update	Adjust rewards for task propagation and completion dynamically	Updates based on real-time participation data to maximize effectiveness within budget	
Recruitment Modeling	Task-Specific Epidemic Model (SIR-based)	Simulates user behavior: idle → propagating → completing	Models task spread through social networks using epidemic-like transitions	
Reward Allocation	Budget-Constrained Optimization Strategy	Distributes rewards optimally within financial constraints	Ensures efficiency in budget usage while balancing reward attractiveness	
Privacy Handling	Decentralized Peer Recruitment (No Profile Access)	Enables user invitations without accessing sensitive social network data	Ensures user privacy and self-driven participation without third-party data extraction	
Engagement Strategy	Role Flexibility Algorithm	Allows users to choose between propagating and/or completing tasks	Increases flexibility, user satisfaction, and sustained involvement	

V. System Architecture

The architecture comprises:

- Requester: Uploads and monitors tasks.
- MCS Platform: Manages rewards, tracks worker participation, and adjusts incentives dynamically.
- Workers/Users: Propagate and/or complete tasks via social networks.

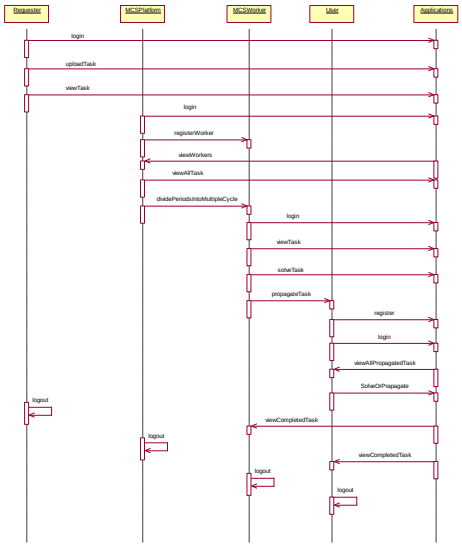
Fig.1



The image is a UML Class Diagram representing the system architecture of the SocialRecruiter project. It defines five main classes: Requester, MCSPlatform, MCSWorker, User, and MCSPlatform. Each class contains attributes (such as username, email, or password) and methods (like login(), logout(), or viewTask()), representing its functionalities.

- Requester uploads and views tasks.
- MCSPlatform manages worker registrations and task monitoring.
- MCSWorker handles viewing, completing, and propagating tasks.
- User represents participants who register, login, and either complete or propagate tasks.
- Relationships between these classes show how different system components interact for task propagation, user registration, and worker management.

This diagram visually captures how different entities collaborate to implement the mobile crowdsourcing platform.



The image represents a **UML Sequence Diagram** for the SocialRecruiter project. It shows how different components in the system interact over time to complete various operations. The diagram includes five main actors: Requester, MCSPlatform, MCSWorker, User, and Applications.

Fig.3 User interface

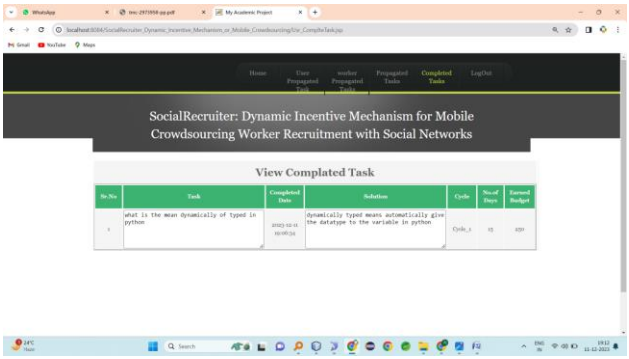


Fig.4 Result

CONCLUSION

This project introduces SocialRecruiter, a novel, dynamic incentive mechanism tailored for MCS systems. It solves key challenges like low participation and cold starts by leveraging user-driven recruitment through social networks. Without invading user privacy, the system dynamically balances propagation and task execution incentives. Experimental validation proves its superiority over existing models.

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