

Location Tracking and Positioning in DTNs

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Abstract—as the vast research in the eld of technology increases, location dependent applications becomes highly important as positioning and tracking of mobile devices plays an important role in context aware and pervasive services. While physical localization and logical localization for satellite has been highly and extensively researched, networks with xed reference points like GSM and WiFi are densely deployed and tracking and positioning techniques in Sparse Disruption Tolerant Networks (DTN) have not been well researched. In this paper, we propose a cooperative and localized method called Pulse Counting for DTN localization and a probability based tracking method called ProbTracking to solve the problem. To evaluate user walking steps and movement orientation, we use Pulse Counting by using cellphones accelerometer and electronic compass. By exploiting the encounters of mobile nodes, it improves the accuracy and estimates user’s location by accumulating walking segments. There are several methods for reneement of location estimation which are also discussed, such as, mutual reneement of location estimation for encountering nodes based on maximum likelihood and adjustment of trajectory based on reference points. We use ProbTracking method to track user movement which uses Markov chain to describe movement patterns and predicts the most possible user walking trajectory without full record of users location.

Key words: Location Tracking, DTNs

I. INTRODUCTION

A. Need

With the increasing research and development in the eld of technology, a location dependent application plays a very important role for positioning and tracking of mobile devices. Physical and logical localization for satellite like GPS has been widely researched and used, networks with xed reference points like GSM and WiFi are densely deployed and tracking and positioning techniques in Sparse Disruption Tolerant Networks (DTN) have not been well researched. There is an increasing demand and need to implement localization techniques in DTN and overcome its problems.

B. Basic Concept

Disruption Tolerant Networks (DTNs) are sparse mobile ad hoc networks where nodes connect with each other intermittently. DTNs allow people to communicate without a network infrastructure. Due to the lack of xed infrastructure and continuous network connection in DTNs, identifying the location of mobile users and tracking their movement trajectories are challenging. To overcome this scenario, a method called Pulse Counting for DTN localization and a probability based tracking method called Prob Tracking is used. Pulse Counting evaluates users walking steps and movement with the help of cellphones accelerometer and electronic compass. By exploiting mobile nodes, it improves the accuracy and estimates users location

by accumulating walking segments. Prob-1Location Tracking and Positioning in DTNs Tracking is used to track user movement. For tracking user movement in DTN using ProbTracking, we follow six steps. Namely, Bootstrapping, Step Counting, Direction Mapping, Trajectory Generation, Location estimation and reneement.

C. Application

It can be used to in a limited eld area, like a university campus or industrys campus, to track the users location and store their trajectory and path history for the later use and path estimation. It can also be used to determine a users location and provide a destination location to which the user wants to travel to.

II. TECHNOLOGY USED

- MySQL
- Android

A. Pulse Counting

Pulse Counting evaluates the number of user walking steps using the accelerometer data, and decides the orientation of each step using the electronic compass measurements. By accumulating the segments of walking steps, it is able to form an estimation of current location. Pulse Counting further takes advantage of the opportunity of encounters in DTNs to rene the location estimation.

B. Prob Tracking

Prob Tracking system can create the most probable user trajectory from incomplete observations. According to the historical movement data, it describes the users mobility asa nite state Markov chain, and generates a rough trajectory for the mobile user based on partial location records (the encountering locations observed by other mobile users).

C. Functional Requirements:

An Android app which will be installed on the users mobile. The app will estimate the users location and demonstrate the moving trajectory in the screen. It can also receive GPS-node, if encountered; the positioning system will receive GPS coordinates to rene the trajectory. Tracking system will be implemented on a PC server which will be connected to the internet and could be accessed via web browser. This tracking server will emulate the trajectories of any users mobile nodes and is play their traces on the map

1) System Architecture:

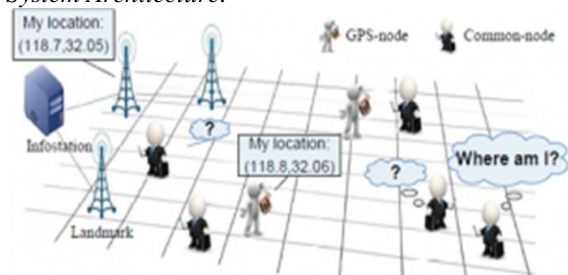


Fig. 1: System Architecture

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III. CONCLUSION

Localization in DTNs faces two major dilties: the mobile node can only uses parse reference points to estimate its location, and the tracking server need to determine and predict movement trajectories with partial location information. To overcome these dilties, we Propose Pulse Counting and Prob Tracking for positioning and tracking in DTNs. Extensive experiments show that the proposed system achieves an average deviation less than 9 m compared to GPS

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