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To Minimize the Distance Travel and Fuel Consumption Using Advance Traffic Navigation System

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Abstract: ***We are aware of Google Map. How it has changed our travel plan for last few years. Little bit enchancement of this navigation system can make our travel plan more easier. Plans:- 1. In Coimbatore usually we see for any rainy day, suddenly queue of cars will come here & there where rain water accumulated. All the bikes avoid those rain accumulated places as a result 4 wheeler is also will suffer. So, if our navigation system enhanced with these info where rain water accumulated, commuters can plan to avoid those places in advance. As a result they can save their time, fuel consumption etc. 2. Google map shows which route will take more time, how many kms we need to cover. Within our selected route also, if we can improve our navigation system where potholes, speed breakers are there 4 wheeler drivers can plan in advance, it will save time as well as it will create less damage to the car. Please think about it***.

I. INTRODUCTION

Google Map is widely used as a platform for a number of applications because of providing the public satellite maps all over the world, but it is hard for user to add vivid interactive applications on website based on Google Map (GM). The reason is that GM can not provide many features of API while allows the application to mix its content with it before. In order to interact with GM instantly and display the application content dynamically, an instant messaging system designed by flex is described in this paper. A travel application is also implemented and embeds in a micro-blog system, including the server part and client part. The application shows that our framework can display dynamic map content and has better ability than the application which interacts with GM by JavaScript.

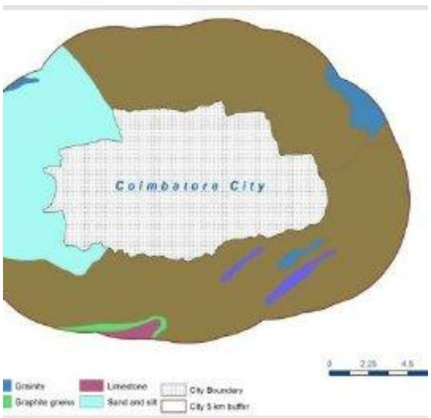

Figure 1: Google Map using android application

So the positioning systems are severely gone down or may get fail all the nodes in indoor environments where the satellite or cellular signals are disturbed, and in order with deep shadowing effects. Algorithms have been proposed to deal with these problems. Fingerprint positioning has many advantages of existing WLAN to achieve indoor locations, which has been widely studied. The analysis of the corresponding positions distribution of similar fingerprints, and then found that the fuzzy similarity between fingerprints is the main problem of the larger errors occured.

With the effect of clusters distribution feature of corresponding positions of the similar fingerprints, we proposed a K-Means+ clustering algorithm to achieve fine-grained fingerprint positioning. Due to the K-Means+ algorithm failing to locate the positions of outliers, we also documented a linear sequence matching algorithm to make error-free outliers positioning, and to decrease the impact of fuzzy similarity. The Experimental results illustrate that our algorithm can get a maximum positioning error less than 5 m, which overcome other algorithms. So all the positioning errors over 4 m in our algorithm are less than 2%. It improves positioning accuracy significantly.

The current researches on fingerprint algorithm mostly focus on two aspects. One is to reduce the cumbersome workload during offline acquisitions, and another is to improve the fingerprint positioning accuracy.And also a localization algorithm named multi objective particle swarm optimization localization algorithm (MOPSOLA) is approved to solve the multi objective optimization localization errors in wireless sensor networks. The multi objective functions consist of the space distance constraint calculation and the geometric topology constraint calculation. The optimal solution is found by multi objective particle swarm optimization algorithm. Dynamic method is adopted to maintain the archive in order to limit the size of archive, and the global optimum is obtained according to the proportion of selection. The simulation results show considerable improvements in terms of localization accuracy and convergence rate while keeping a limited archive size by a method using the global optimal selection operator and dynamically maintaining the archive.

II. RELATED WORK

Fingerprint positioning with no limit of extra deployment is widely studied. Various methods, such as deterministic KNN, Bayesian estimation Sequential Monte Carlo, support vector machine and neural network are used for improving positioning accuracy. But most of fingerprint algorithms rarely reduce the larger errors caused by the body blocking in order to improve the positioning accuracy.

Figure 2: WLAN (IEEE 802.11)

This midrange wireless local area network (WLAN) standard, operating in the 2.4-GHz Industrial, Scientific and Medical (ISM) band, has become very popular in public hotspots and enterprise locations during the last few years. With a typical gross bit rate of 11, 54, or 108 Mbps and a range of 50–100 m, IEEE 802.11 is currently the dominant local wireless networking standard. It is, therefore, appealing to use an existing WLAN infrastructure for indoor location as well, by adding a location server. The accuracy of typical WLAN positioning systems using RSS is approximately 3 to 30 m, with an update rate in the range of few seconds.

A. *Fingerprint fuzzy similarity and positioning performance*

1.1 Body Blocking Influence : To analyze the WiFi signal fingerprints positioning performance, we first conduct a study on the impact of various factors, such as orientation and holding position. Due to the development of smart phones, people use the mobile phone to obtain indoor positioning ser-vices increasingly. So we select a GALAXY Note 3 as the WiFi terminal device to acquire signal data. The test mainly studies the multipath and shadow influence on the WiFi signal fingerprint without considering the factor of device diversity. The testbed is an open lab area of 38 m $*$ 26 m. Because the desks and chairs cover some parts of indoor office area, we just choose the 76 positions in the passable region (e.g., corridors) to sample signal fingerprint. There are 8 APs deployed for measurement as shown in Figure 1.

At each sampling point, the user faces 0∘ , 90∘ , 180∘ , and 270∘ directions and holds the bottom and upper positions of mobile phone, respectively, to measure signal strength. Each measurement acquires 15 groups of signal strengths to calculate an average value. Thus we will generate a total of 608 records in the offline fingerprint database. Generally, wireless signal strength will change with time leading to some measurement errors [15]. Suppose that these measurement errors follow zero mean normal distri-bution with ε variance. Fingerprint matching often uses the Euclidean distance to measure the similarity of fingerprint vectors, and then the maximum measurement error emax between fingerprints could be calculated by the following equation:

n2 emax = √ ∑ [(r i + ε) − (r i − ε)] = 2ε√ n, (1)

i=1

where ε is the variance of signal strength distribution, r i is the received signal strength from ith AP, and n is the number of APs. Only when the distance of two fingerprint vectors is greater than emax will there be significant fingerprint dissim-ilarity, which is called fingerprint granularity in this paper. Since error ε is the inherent error from signal measurement, we call emax the maximum intrinsic fingerprint granularity error. To analyze the influence on fingerprint granularity and positioning performance with different orientations and holding positions on mobile phone, we design four group tests using the 608 fingerprint records to evaluate orientation and holding position. We select 30 sampling points of the 76 points in Figure 1 to execute 5 times KNN algorithm to com-pute the average value of the positioning errors. Meanwhile, we compute the Euclidean distances between 608 fingerprints to construct the fingerprint granularity distribution. In Figure2, different orientation tests include the comparison between 0∘ orientation fingerprints and 90∘ orientation fingerprints and between 0∘ orientation fingerprints while holding the bottom of mobile device. Different holding positions tests include the comparison between holding bottom and upper position fingerprints and between holding bottom position fingerprints with 180∘ orientation.

Consider the fingerprint fuzzy similarity problem in the practical application of fingerprint posi-tioning, which uses the existing mobile phone to provide a peer assisted algorithm. They adopt the sound ranging method to measure the distance between mobile users by the microphone and loudspeaker of mobile phone and use the acquired distance relationship between mobile users to constrain the fingerprint positioning results, which can prevent the emergence of larger errors. This method can avoid larger positioning errors, but it requires additional sound-based ranging method which will increase the energy consumption of positioning service. More importantly, the sound-based ranging method is hardly used in noisy public environments. We analyze the distribution features of offline similar fingerprints and find similar fingerprints have a cluster position distribution feature besides the fuzzy similarity. Therefore, we design an efficient clustering method on offline fingerprints to eliminate fuzzy similarity and avoid the restrictions of sound ranging.

III. MOPSOLA

The particle swarm optimization (PSO) algorithm is concerned by many researchers for its fast convergence rate and simple implementation. By using particles to imitate the estimated coordinates of unknown nodes, some methods model the localization problem as a single-objective optimization model with the space distance constraint as the only fitness function. For example, the PSO localization algorithm based on log-barrier constraint function could accelerate the convergence speed and save energy [4], the PSO localization adopting crossover operator and the mutation operator could avoid the premature convergence [5], and the PSO localization algorithm based on quantum mechanics could enhance the global convergence and improve the accuracy [6]. However, it always happens that the results of estimated nodes' localizations meet the space distance constraint without meeting the geometric topology constraint because of ranging errors in some practical applications.

B. Describing of MOPSOLA

3.2.1. Overall Framework : the framework of the proposed multi-objective PSO algorithm includes some key operators such as maintenance of archive, global optimum selection, and the velocity and localization update. The particle population relies on an archive to save Pareto optimal solutions during the iterative process and selecting the global optimum from these solutions, which is the key point that the multi-objective PSO is different from the traditional single objective localization. Therefore, the localization issue is modelled as a multi-objective optimization model in MOPSOLA, and two operators, which are the dynamic maintenance operator for the archive and the global optimum selection operator based on proportion of selection, are designed to be suitable for the limited energy and the poor computing power of WSN nodes.

1) In the multi-objective function calculation level, functions as formulas (3)–(5) are calculated according to all particles, that is, all estimated nodes' coordinates.

2) In the individual optimal selection level, the personal optimum selection operator works. Based on the concept of Pareto optimality, the pbest of each particle is chosen between the particle's current location and its historical pbest dynamically.

3) In the global optimal selection level, the global optimum selection operator works. The proportion of selection is set for each Pareto optimal solution based on intensive distance, and a global optimum for each particle is selected by proportion of selection.

4) In the velocity and localization update level, the position and velocity update operator works for all individual particles. The update process is similar to the traditional single objective PSO as

$$V_i(t+1) = \omega V_i(t) + c_1 r_1 (pbest_i - h_i(t)) + c_2 r_2 (gbest - h_i(t)),$$

$$h_i(t+1) = h_i(t) + V_i(t+1), \quad i = m + 1, m + 2, \ldots, n,$$

where V_i is the velocity of the ith particle , $h_i = (\hat{x}_i, \hat{y}_i)$ is the estimated coordinates of the ith particle vector is the best solution for the ith particle, gbest is the best solution for the population, ω is the inertia weight, c_1 and c_2 are constants, and t is the iteration time.

5) In the maintenance of archive level, the archive maintenance operator works. The maximum capacity of archive is set as ArcMax and the archive is dynamically updated according to the density distance in the objective space of the Pareto optimal solution to save the storage space.

IV. CONCLUSION

Fingerprint localisation algorithm for WSN experimental result shows that the proposed algorithm improves the accuracy by atleast 50% the target node and the number of neighbour nodes. The maximum positioning error is less than 5m by using this fuzzy similarity elimination algorithm. MOPSOLA also increases the localization accuracy to the minimum extent.

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