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Bus Arrival Time Prediction System: Some Best Practices

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Abstract-Most passengers indicate that they want to instantly track the arrival time of the next buses and they are willing to contribute their location information on buses to help to establish a system to estimate the arrival time at various bus stops for the community. The system predicting bus arrival time with mobile phone based participatory sensing, trigger the data collection and transmission only when necessary. Here in this paper some of the best techniques are discussed. With time goes new techniques are evolved with different accuracy and timeliness. Passengers demand highly accurate and fast result. Each system's technique varies from one another. The techniques used merits and demerits of different bus arrival time prediction systems are studied and analyzed in this paper.
Keywords – PBN, startrack

I. HOW LONG TO WAIT? PREDICTING BUS ARRIVAL TIME WITH MOBILE PHONE BASED PARTICIPATORY SENSING

Predicting bus arrival time with mobile phone based participatory sensing, present a novel bus arrival time prediction system based on crowd-participatory sensing. Here interviewed bus passengers on acquiring the bus arrival time. Most passengers demand that they want to instantly track the arrival time of the next buses and they are willing to contribute their location information on buses to help to establish a system to estimate the arrival time at various bus stops for the community. This inspires us to design a crowd-participated service to bridge those who want to know bus arrival time (querying users) to those who are on the bus and able to share the instant bus route information (sharing users). To achieve such a goal, here let the bus passengers themselves cooperatively sense the bus route information using commodity mobile phones. In particular, the sharing passengers may anonymously upload their sensing data collected on buses to a processing server, which intelligently processes the data and distributes useful information to those querying users.

II. STARTRACK- A FRAMEWORK FOR ENABLING TRACK-BASED APPLICATIONS.

StarTrack is a system that enables extensive works on tracks. A track is a discrete and sampled illustration of a continuous route. Mobile devices gather tracks and opportunistically upload them to a central server. StarTrack includes facilities for storing, comparing, clustering, indexing and retrieving tracks. It serves as the base for building large-scale track-based services. Overall this paper makes the following contributions: First, we present an abstraction of a track that we believe is useful for a large class of interesting applications. Second, we present efficient algorithms for manipulating tracks including comparison and clustering. Third, we show that StarTrack can handle large volumes of tracks across multiple users. Tracks are recorded, under control of an application, and saved in a database along with previously recorded tracks from various users. Each track is owned by a particular person, and the owner of a track can specify who is allowed to get that track. Each track entry is a tuple consisting of a site, time, and optional application specific metadata in the form of an XML document with arbitrary contents. For instance, users may choose to attach photos, sticky notes, or location based advertising to particular track entries.

III. EASYTRACKER- AUTOMATIC TRANSIT TRACKING, MAPPING, AND ARRIVAL TIME PREDICTION USING SMARTPHONES

The system consists of four main parts -

A. An off-the-shelf smartphone, installed in each bus or carried by each driver, functioning as an automatic vehicle location system or tracking device

B. Batch processing on a back-end server, it turns stored vehicle trajectories into route maps, schedules, and prediction parameters

C. Online processing on a back-end server which uses the real-time location of a vehicle to produce arrival time predictions

D. A user interface that permit a user to access current vehicle locations and predicted arrival times.

Using EasyTracker, a transit agency can implement a sophisticated bus-tracking and arrival time prediction system by simply purchasing a number of smartphones and downloading the bus- tracking app to each phone. EasyTracker has considerable advantages over the current state of the art. First, the use of standard smartphone hardware reduces both the one-time and recurring costs involved in establishing a real-time transit tracking system. Second, since the system automates the process of route map and schedule creation, cost and required user input are dramatically reduced. Third, due to its automated nature, our system is able to adjust the published routes and schedules in response to road construction or predictable congestion events.The scientific contributions of this paper are as follows-

A. An algorithm for deriving the set of serviced routes from a collection of unlabeled GPS traces, requiring no driver interaction or other user input.

B. An algorithm for determining the locations of transit stops along these routes.

C. A means of automatically producing an estimate of the route schedule, describing hours of operation and intended arrival times for arrival time prediction.

IV. STARTRACK NEXT GENERATION- A SCALABLE INFRASTRUCTURE FOR TRACK-BASED APPLICATIONS

This work describes how the design and implementation of StarTrack have evolved non-trivially to address real-world issues of dealing with tracks. This experience with track-based applications is admittedly limited. Here do not claim our API is universal or fundamental in any sense; it will undoubtedly evolve as we encounter new classes of applications that we have not anticipated. Nonetheless, we believe this work and experience to date will be beneficial to researchers and practitioners in this rapidly growing field. In general, here found managing and providing semantically rich operations on tracks to be surprisingly difficult. Track queries are complex because they involve geographic and similarity constraints and a naive solution requiring expensive evaluation of these constraints do not scale to real-world online demand. The main insight we use in tackling the complexity of tracks is to recognize that tracks tend to be repetitive. Repetitiveness arises from two distinct sources. An individual tends to follow substantially similar routes in his daily life. This intuition is supported scientifically by a recent study in Science. Second, the vast majority of tracks are collected on roads and highways, again leading to significant overlap in tracks even if they are from different users. This insight permeates all parts of our revamped Star- Track infrastructure. We made several changes to our system. In some cases, we needed new techniques and data structures; in other cases, we used more established techniques, but synthesized in novel ways, to support a new class of track-based applications efficiently.

V. PBN- TOWARDS PRACTICAL ACTIVITY RECOGNITION USING SMARTPHONE-BASED BODY SENSOR NETWORKS

With PBN, here provide an online training solution which detects when retraining is needed by analyzing the information divergence between training and runtime data distributions and integrating this analysis with the ensemble classifier. In this way, PBN determines when retraining is needed without the need to request ground truth from the user. Furthermore, we investigate the properties of sensors and sensor data to identify sensors which are accurate and have diverse classification results. From this analysis, we are able to prevent the ensemble classifier from needlessly consuming computational overhead by using redundant sensors in the online training process. Our main contributions are-

A. Here combine the sensing capability of on-body Tiny OS based motes with the sensors, computational power, portability, and user interface of an Android smartphone.

B. An activity recognition approach appropriate for low power wireless motes and mobile phones that does not rely on a backend server. Our approach handles BSN dynamics without sophisticated parameter tuning and also accurately classifies difficult tasks.

C. Here provide retraining detection without requesting ground truth from the user, reducing the invasiveness of the system.

D. Here reduce online training costs by detecting redundant sensors and excluding them from the ensemble classifier.

VI. MINING FREQUENT TRAJECTORY PATTERNS FOR ACTIVITY MONITORING USING RADIO FREQUENCY TAG ARRAYS

Monitoring with video cameras has following limitations. First, the target trajectories must be predefined. Once the trajectories change, the cameras may need to be redeployed. Indeed, the frequent trajectories may not be known and they frequently change over time in many situations. Second, except for the target trajectories, monitoring other regions is hard. Third, automatically analyzing the images from multiple cameras and detecting irregular activities is not trivial. And last, digital cameras are costly. It is often a financial concern to install a large number of cameras. Here propose a novel application of the Radio Frequency IDentification (RFID) technology to provide an inexpensive and relatively accurate approach to activity monitoring. By employing an array of RF tags and a few RF readers, we use data mining techniques to detect and analyze frequent trajectory patterns. We focus on mining frequent patterns as these patterns can be used as domain knowledge to capture any anomalies. Since RF tags and readers are much cheaper than cameras (in US dollars, an active RF tag is about 50 cents and an RF reader is several hundred dollars), and data mining techniques can detect frequent patterns online, our approach is more flexible and much cost-efficient than the video monitoring solutions. The major contributions of this work are as follows. First, we introduce a novel RFID application that uses an array of stationary RF tags to monitor activities in large fields. Different from the traditional radio-based localization methods, this approach does not require the tracking objects to carry any transmitters or receivers, such as RF readers or tags. Second, here model a data mining problem that is critical for the activity monitoring application using RFID. Although many attractive sequential pattern mining approaches have been proposed, addressing the problem proposed in this paper is nontrivial, due to the noisy RF tag data. All the previous proposals assumed the data are precise, therefore, they cannot be applied to mining RF tag data. To solve the problem, we propose a fault-tolerant sequential pattern mining from an array of time series generated by the RF tags.

VII. PUBLIC BUS RRIVAL TIME PREDICTION BASED ON TRAFFIC INFORMATION MANAGEMENT SYSTEM

This paper presents a statistical approach to predict the public bus arrival time based on traffic information management system. It considers a number of factors influencing bus travel time, such as departure time, current bus location, number of links, number of intersections, passenger request at each stop and traffic status of the urban network, etc. A linear model is given to explain the bus arrival time. The parameters of the model are trained by the historical bus arrival times. A prototype system is built to verify the practicability and efficiency of the approach. The approach has been proved relatively accurate and efficient by experiments. Weak connectivity is the connectivity provided by networks in which connection is often lost for short periods of time, is slow or costly, making prudent use of bandwidth necessary. To handle faint connectivity, various optimizations have been proposed such as selective servicing of cache misses, compression techniques, background re integration of local updates, as well as compromising the properties of data provided to the mobile client.

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