Cross-Platform Application Using PHONEGAP

Tanvi Seth[1], Uzma Shaikh[2], Rohan Paris[3], Suraj Balwan[4], Jayshree Pansare[5]
Department of Computer
[1,2,3,4,5] Modern Education Society's College Of Engineering

Abstract- *Platform independency is one of the most desirable feature that makes an application more profitable and time efficient. Various cross-platform tools have been developed that are used with minimal expertise in programming languages making it more development friendly, namely PhoneGap, Titanium, Ionic, etc. PhoneGap outperforms the others in terms of ease of development and efficiency. An application is proposed using PhoneGap that uses Geolocation to find the nearest place from the current location and corresponding algorithms are discussed.*

I. INTRODUCTION

HTML5 offers interfaces to various sensors of the mobile device, thus rendering the same performance as a native app. The versatility of HTML5 contributes the most to its growing popularity among cross-platform app development frameworks [1]. Native apps execute only on the OS they are written for. However, cross-platform apps have the ability to be installed on any OS. Therefore greater reachability with less development cost is the key advantage of cross-platform apps as opposed to native app [2]. The cut-throat competition between the prevailing companies such as Google, Apple and Microsoft has led to the disintegration of the operating systems that support certain platforms. The painful task of rescripting the code for different OS has paved the way for the emergence of cross-platform development frameworks such as PhoneGap [3].

Various cross-platform tools are compared to overcome challenges in mobile application development. PhoneGap is considered the best amongst all when compared on parameters of CPU, memory and power consumption [4]. The use of cross-platform tools like PhoneGap overcomes the incompatibilities of mobile phone platforms. It describes all functionalities offered by the tool and how it turns out as the most suitable choice because of its ease of use and available APIs [5]. The concept of "once development multi-operation" is demonstrated with help of a friends positioning mobile application which uses Map world as data support and facilitates single and multiple people tracking [6].

Comparative analysis of K-Nearest Neighbor (KNN) and Modified K-Nearest Neighbor (MKNN) classification algorithms is carried out on the Conditional Cash Transfer Implementation Unit. The output from K-Fold Cross Validation model used for training and testing data sets resulted with an average accuracy of 93.94% for KNN and 99.20% for MKNN over 10 data samples. MKNN algorithm is capable of handling accuracy better for classification than KNN algorithm [7]. Geohashing and MapReduce algorithm is presented to find an interesting location around any current location. MapReduce is used to operate parally on large size dataset in less amount of time [8]. Spatial Inverted Index method is implemented for faster and accurate retrieval of location using specific keywords describing the location. This method overcomes the short comings of Information Retrieval R-Tree (IR-2) and Inverted index method [9].

A literature survey has been performed to examine the trends in cross-platform mobile development over the last few years. According to the survey web-based approach is most suitable for cross-platform application development. It has been also observed that even though cross-platform tools are not yet fully developed they demonstrate great potential [10].

II. CROSS-PLATFORM

Extensive employment of mobile applications on smart phones and other gadgets has led to the explosion of the application development industry. Each operating system requires a distinct development procedure that increases cost and effort. Cross-platform development strategy is the solution to the problem. Cross-platform development uses web technologies to achieve the functionalities of native apps in a platform-independent manner [1].

With the existence of various operating systems namely Android, iOS, Windows and Tizen knowledge of different programming languages is a primary requirement that may not always be feasible. Web-based components, such as HTML, CSS, and JavaScript are fine alternatives that allow the developers to maintain only one copy of the code that may be deployed on any operating system or screen resolution [2].

Several cross-platform app development frameworks are available in market such as Rhodes, PhoneGap and Appcelerator Tit anium. Each has its own merits and drawbacks. PhoneGap is relatively easy to use and understand,

provides a strong library of APIs that tap into the phone's components and facilitates faster development [3].

III. PHONEGAP

Developing mobile applications for different operating systems require additional expenditure and in-depth knowledge of the SDKs and this brings into the picture the requirement of cross-platform applications. There are a number of tools like PhoneGap, Titanium, Rhomobile developed to meet these requirements but still there arises a need to compare them and choose the most appropriate tool. The requirements for any cross-platform application are namely: multiplatform support, rich UI, backend communication and security. Keeping in mind the basic architecture for any cross-platform application and the consumption of memory, power and CPU PhoneGap is found to be the best and most efficient one [4].

There are many smart phones and different OS for them which makes application development difficult from the development aspect, preserve aspect and cost aspect. Cross-platform development overcomes them and removes the language barrier in building any application. PhoneGap considered the best one uses HTML, CSS, JAVASCRIPT for development. It has contact API, geolocation API, camera API, file API, etc. It uses the web application to realize native applications. The web-view component is used for this purpose and the client program first runs in the browser and the visits native app to perform the required action. PhoneGap bridges the gap between mobile platforms and provides a better development environment [5].

A demonstration of the hybrid system gives than by a real-time positioning application using PhoneGap. It uses HTML5 and javascript which reduces development efforts and cost. Phone built GPS and sensor is used to locate single or multiple persons. Various functions which were included are map manipulation, query function, login and registration ,compass function, positioning function. Precisely this application demonstrates hybrid application development following the principle of write once run anywhere as well as shows the efficiency of PhoneGap tool for its development [6].

IV.GEOLOCATION

Data mining is the process used to extract required data from large datasets. Data mining techniques include Association, Classification, Regression, Prediction. In this paper, KNN and MKNN classification algorithms are compared to classify Conditional Cash Transfer Implementation Unit's data which has 7395 records. K-Fold Cross Validation was done before the classification of records to find the most suitable data model which resulted in 93.945% accuracy. The output from K-Fold Cross Validation model was used for training and testing data sets of KNN and MKNN. Classification result produced an average accuracy of 93.94% for KNN and 99.20% for MKNN over 10 data samples. MKNN algorithm is better and more accurate than KNN algorithm [7].

The algorithm is presented to focus on the problem of finding the desired location around any current location using Geohashing. The nearest location is obtained by implementing the Open box query. MapReduce framework works on Map and Reduce functions. Latitude and Longitude are given as input to Map function in decimal format. Geohashing is implemented to obtain latitude and longitude pair which is converted into a single value represented in binary format and the result is stored in variable geocode. MapReduce framework is used to implement large dataset in Geospatial queries parallelly. This is done by dividing the input into independent sets and executing them parallelly over various mappers. The combined implementation of Geohashing and MapReduce gives accurate result while finding the nearest location [8].

Range search and Nearest neighbor retrieval consist of geometrical properties of related entities to compute the spatial queries in the conventional method. To improve the conventional method we try to compute spatial queries containing location and associated texts. For example, instead of searching nearest restaurants by location, fetch restaurants containing appropriate keywords like famous for south Indian dishes etc. Information Retrieval R-Tree (IR-2) and Inverted index are capable of solving such queries but lack efficiency. To deal with verification and time complex methods Spatial Inverted Index method is implemented. It is an improved version of the Inverted Index [9].

V. PROPOSED SYSTEM

The application has two types of registrations-

i. Restaurants, wedding halls, parties or any place where food is made in bulk quantities.

ii. NGOs and governmental organizations that work towards providing food for the needy.

The donor generates an alert to notify the availability of food. The application then performs a location-based search, using a data mining algorithm, and depending upon the location of the donor suggests the nearest available place to donate the food.
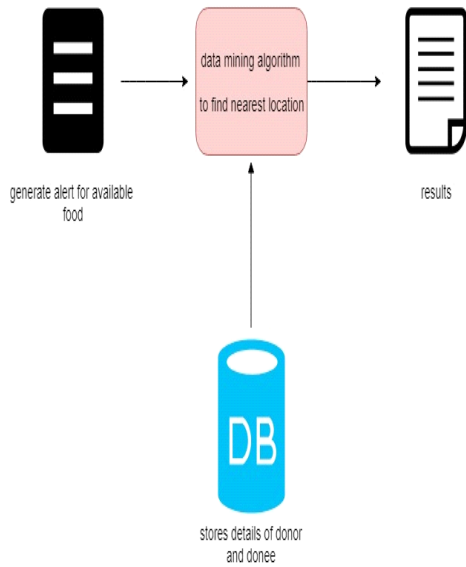
Fig.1 Proposed System

VI. COMPARISON BETWEEN NATIVE AND CROSS-PLATFORM APPLICATION

Mobile computing devices have made immense growth and have become worldwide in recent years. The rapid growth has brought several challenges in the field of the mobile development process. While the native approach of mobile development platform is still preferred there has been a shift in developing cross-platform mobile applications as well. In native mobile development approach, developers use the Software Development Kit (SDK) aimed and modified for precise platform targeting a particular Operating System for creating an application. High functionality, reliability and faster performance are some of the benefits of native app development. Web-based solutions have recently gained drive because of developments in HTML5. The performance space between web-based mobile apps and native apps is reducing constantly. The benefits of cross-platform applications include easy to build, a single app for all platforms, use of API's to access device facilities, etc. Primarily hybrid approaches are bringing unification of the development process for different platforms [10].

Native Applications	Cross-platform Application
Native applications are restricted to the market of the OS they are built for.	Exposure to a larger number of users – the application is available in most environments.
Native applications incur higher development cost.	Cross-platform applications not only cut costs but also maximize the profit both in terms of a number of users and revenue.
Launch effort is distributed among multiple source codes. Implementing an MVP an subsequent upgrades result in fragmentation.	Launch effort may be centralized on the single source code. The fragmentation when implementing an MVP and also in subsequent upgrades does not exist.
Separate error resolution efforts are needed for various versions of the same applications.	When the code produces a bug, one single solution shall be used for all the environments.
Experts in various languages are required for developing application for a variety of OS thereby increasing cost and time requirements.	It is not necessary to incorporate new profiles to the team other than those that are already serving a desktop version: having a team knowledgeable in HTML, CSS and JavaScript would be enough.

VII. CONCLUSION

In this paper we have discussed need for platform independent application and various cross-platform development tools have been compared and it is concluded that PhoneGap outperforms the rest in terms of efficiency and ease of developement. An application based on PhoneGap is proposed along with necessary algorithms and architecture.

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