Immediate Listing of Business on Google Maps with Abstract Business Listing using a Mobile Application

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Abstract: A local business listing in Google Maps can be created online with "Google My Business". These listings are verified and reviewed by Google following which they appear in Google Maps after 1 to 2 weeks, on successful validation. In this paper we propose a working system, which can list a business immediately and accurately on Google Maps using a mobile application. During business listing, business details and location of the business are uploaded to a remote server. Unlike Google listings, business listings in the remote server are modifiable. Small and medium scale businesses that prefer hassle-free and immediate listing of business can use this application. Additionally moveable businesses can frequently update their location and details. Abuse of this technology can be avoided by having paid accounts for business owners. Also fraud business listings can be reported by users, which can be removed subsequently.

Introduction

A business can be listed in Google Maps using "Google My Business" [1]. Creation of a new business listing involves verification of address (see Figure 1) followed by a review [2] [3]. The entire process takes around 1 to 2 weeks. In this paper we propose a mobile application which can list businesses on Google maps immediately and accurately. The business listings are abstract because business details, entered by a business owner, are not uploaded to Google Places Database using Google APIs [4], but are uploaded to a remote server (maintained by us). Hence these listings appear only in a search initiated by this application. The Search interface accepts a product name and retrieves related business listings from both Google places database using Google APIs [4] and from the remote server, in a nearby radius of 20km.

To enhance and facilitate quick search and retrieval of data from the remote server, we use search optimization techniques which we discuss elaborately in Search Optimization section.

This application is designed especially for those businesses in which address and business details (such as primary product, secondary products, discounts, etc.) require frequent modification and needs immediate updating. Also, business owners who want to use a simple interface to list their business can use this mobile application.

One way of preventing abuse of this application is to have paid account for business owner. Additionally users can report a business, which can be removed subsequently. Also ratings and comments of other users can help a person in deciding the credibility of a listing.
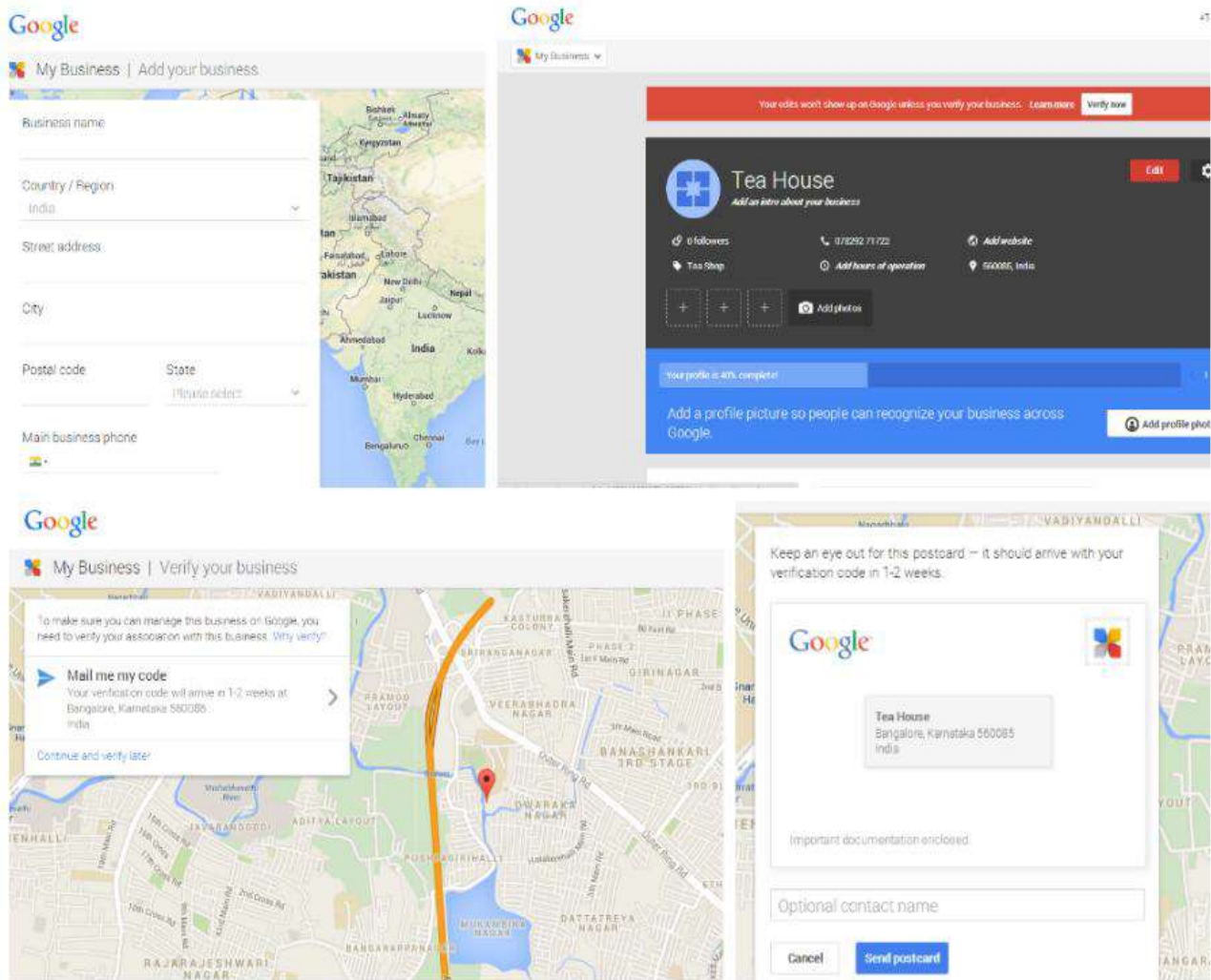
Figure 1: Top-Left: A form to be filled when providing location details of a new business listing.
Bottom-Left: The marker needs to be positioned accurately to indicate the location of the business.
The text box shows that Google verifies address of a business by sending a verification code by post.
Bottom-Right: A view of the postcard sent.
Top-Right: A Google Plus page for a business.

Background

Listing business on Maps is provided by many organizations. For example, Yahoo uses Yahoo Maps [5], Apple Inc. uses Apple Maps [6], MapQuest has their own business listing directory [7]. Although in the current project, we aim to provide an immediate, accurate and efficient way of listing businesses exclusively in Google Maps, the application of this concept can be extended to other maps as well.

"Google My Business" connects business owners to customers directly, on Google search, Google Maps, and Google plus [1]. Google provides an online interface for this purpose. To create a new business listing, a Google Plus account needs to be created. The business category should be selected; its location should be indicated on Google maps; and details of the location should be saved. To verify a business Google sends a postcard containing a verification code by mail to the address of the business owner. This usually takes 1 to 2 weeks. Phone verification is also possible but this is not available to new listings [8]. A business needs to have a Google Plus page where details of the business including opening hours, website, and company/organization name, etc. should be updated. Figure 1 shows a few screenshots of the various processes involved in listing business using "Google My Business". Finally all business listings are

moderated or reviewed to ensure they comply with business configuration rules set by Google [2]. Once moderation is successful, the business appears on Google Maps, Google Search and Google Plus.

Design

The mobile application has two parts – create a new business listing, Search a Business in a nearby radius of 20km. In order to create a business listing, a business owner has to create an account, and login. He needs to enter his business details, such as name of his shop/organization, primary product name, secondary product names, and address and phone number, and save the details. He can also take a snapshot of his enterprise. Then he has to upload all his business details to a remote server.

The Search interface accepts a product name and retrieves related business listings from both Google places database using Google APIs [4] and from the remote server, in a nearby radius of 20km. Since computing distance between the user and all listings of the same category as requested by the user, in order to select only nearby businesses, is a time consuming task it is ruled out. Instead a search space reduction algorithm is used followed by distance computation for a few server listings. We cover this concept in more details in the next section, search optimization.
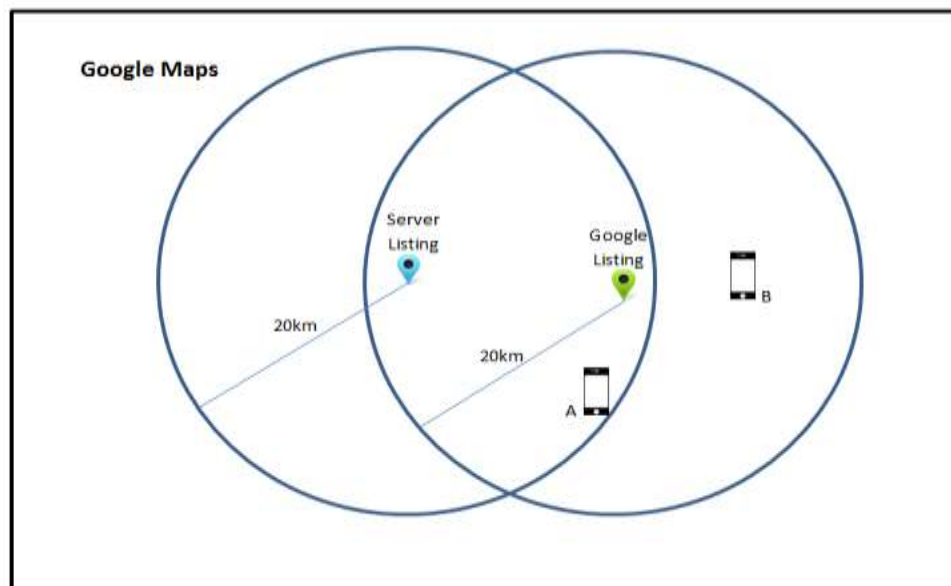
Search Optimization

Figure 2: Schematic diagram showing Google and Server listing on Google Maps, relationship between them and with Client devices.

In order to create a Business listing using the mobile application, the following are the sequence of operations:

1. The device's current location in terms of latitude and longitude is fetched using GPS.
2. The device requests a nearby search to Google places server [4] to locate the highest ranked business listing of the same category (as requested by the user) within 20km radius.
3. If a non-null list of business listing is returned by Google, then the device assigns the reference ID of the highest ranked business listing as parent reference ID to the server listing.
4. If an empty list is returned, a parent reference ID is created using the business name of the server listing and address information obtained from a Geocoder (reverse geocoding) [9].
5. Finally the device sends details of the business to be listed, its current location and the parent reference ID to the remote server.

The sequence of operations for searching a business and locating them on Google maps is explained using Figure 2:

1. In Fig. 2 Customer Devices A and B at first request Google Servers to locate nearby businesses providing a particular product.

2. If Google returns a non-null list of business listings, then the reference ID of the highest ranked business listing (parent listing) is extracted.

3. If Google returns an empty list, the customer's device creates a parent listing reference ID using queried product name and address information obtained from a Geocoder

4. The customer devices A and B then request the remote server to locate all business listings providing the requested product and located within a radius of 20km from the customer devices.

5. The customer device sends the following information to the remote server

    a. The customer device's location

    b. The parent listing reference ID

    c. The queried product name

6. The remote server does the following:

    a. Using the reference ID it selects only those business listings which have the same parent reference ID and whose primary product matches the customer's requirement.

    b. It then uses the customer's current location to find the Euclidean distance between the customer's location and each of the selected business listing's location. All those listings within 20km are returned.

    By assigning each server listing to a Google listing (parent listing), we have restricted computation of the Euclidean distance for only a few number of listings instead of all listings in the same business category.

7. In Fig. 2, the remote server returns the server listing marked with a blue marker to device A and null to device B, because the server listing is within 20km from A and beyond 20km from B.

8. In device A both green and blue markers appear and in device B only the green marker appear.

Results and Conclusion

When a user searches for a product, related business listings in the nearby radius of 20km are fetched from both Google server and the remote server. The data is fetched in real time, and there is no significant additional delay due to the fetch from the remote server. In Fig. 3, a customer searched for snacks, and got back a collection of business listings from both Google and remote server. The left image shows a marker named "G: Delhi Snacks" and the right image shows a marker named "M: my snacks shop". The listing preceded by "G" is a Google listing and a listing preceded by "M" is a server listing. On clicking the info window of Google listing, data is fetched from Google server and populated on an Android webview (left image of Figure 4). Similarly on clicking info window of a server listing, data is fetched from the remote server and populated on a separate Android webview (right image of Figure 4)
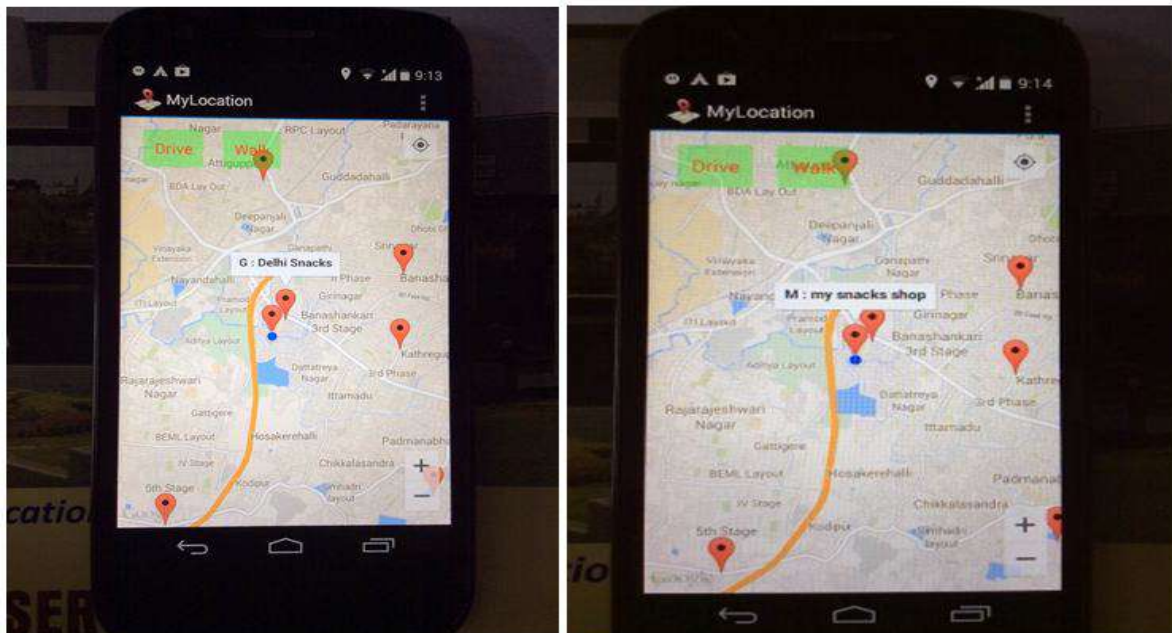.

Figure 3: Co-existence of Google listings and Server listings on the same map. Left Image shows a Google listing being clicked (starts with G) and Right Image shows a server listing being clicked (starts with M).
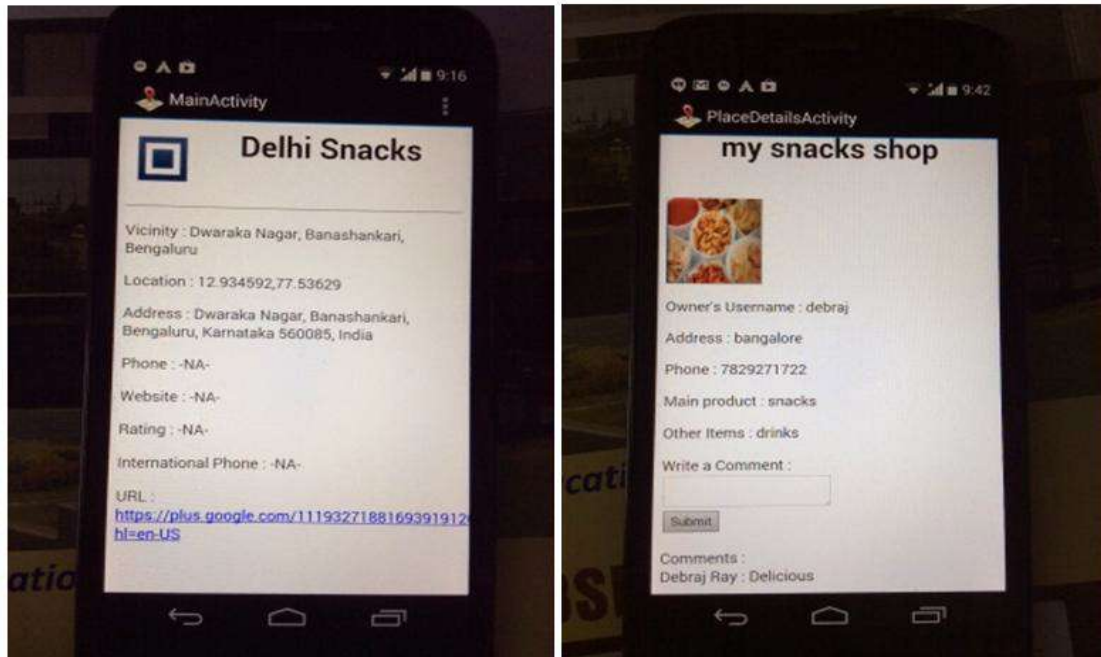
Figure 4: Left image: On clicking info window of a Google listing data is fetched from Google server and displayed in an Android webview. Right image: shows data being fetched from the remote server, and displayed in a separate Android webview, when info window of server listing is clicked.

Business listing using the mobile application happens immediately as and when a request is made. Also these listings can be updated or deleted immediately using the same mobile application. Another advantage is that with a smart phone, accurate location can be obtained by using GPS, while this is not available in the online interface, where an approximate address is used (for example by dragging the marker to a particular location on the map). This in turn considerably increases the location accuracy and reliability of positioning a business on Google Maps, and also reduces the time to list a business. The application has been built and tested successfully on Android 2.3.3 (Gingerbread), Android 4.0.4 (Ice Cream Sandwich), Android 4.2.2 (Jelly bean) and Android 4.4.4 (Kitkat). Further developments include enhancing security of the application to prevent abuse. Performance can be further improved by using a high performance remote server to ensure faster computation and retrieval of data for a large number of business listings.

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