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Postal Address Code Generation

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ABSTRACT:Postal code generation is a process of creating unique codes assigned to specific geographic locations. These codes are used to facilitate the sorting and delivery of mail and other postal items. The generation of postal codes involves a complex algorithm that considers various factors such as population density, geography, and infrastructure. The process typically involves the use of advanced computer software and databases to generate unique codes that accurately correspond to specific locations. The development of postal codes has revolutionized the postal industry, enabling faster and more efficient delivery of mail and other postal items. As technology continues to advance, the process of postal code generation is likely to become even more sophisticated and accurate, further improving the efficiency of the postal system.

KEYWORDS: Postal code generation, geographic location, complex algorithm, unique codes.

I. INTRODUCTION

Postal Code Generation Android App is a powerful tool that allows users to easily generate valid postal codes for any location around the world. This app is designed to make it easier for users to input accurate and precise postal codes when filling out forms or sending mail.

With this app, users can enter a country, state/province, city, or even a street name, and the app will generate a postal code based on that information. This eliminates the need to search for postal codes online or consult a paper directory.

The app is perfect for people who frequently send mail or need to fill out online forms that require postal codes. It is also useful for businesses that need to keep accurate records of customer addresses and zip codes.

Overall, the Postal Code Generation Android App is a valuable tool for anyone who needs to quickly and easily generate accurate postal codes for any location in the world.

II. PROBLEM STATEMENT

The Postal Address Code Generation Android Project aims to simplify the process of generating postal codes for addresses. Often, people struggle to find the correct postal code for their address, leading to delays in deliveries or important documents getting lost in transit. This project seeks to address this issue by creating an easy-to-use Android application that generates accurate postal codes for any given address in a matter of seconds.

The project will involve integrating a database of postal codes with a user-friendly interface that allows users to input their address information, such as street name, city, and country, and receive a generated postal code.

The project's success will be measured by the accuracy and speed of the generated postal codes, the user-friendliness of the application, and the number of users who adopt and use the application regularly.

III.TECH STACK

What is an Android Application -

Android Studio and Firebase are used for developing our project which is available everywhere. It provides a technical guarantee of accuracy, reliability, and security. The current system development is technically feasible with all the resources needed for the development of the apps as well as the maintenance of the same is easy.

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS, and Linux-based operating systems. It is a replacement for the Eclipse Android Development Tools (ADT) as the primary IDE for native Android application development.

Android Studio was announced on May 16, 2013, at the Google I/O conference. It was in the early access preview stage starting from version 0.1 in May 2013, then entered the beta stage starting from version 0.8 which was released in June 2014. The first stable build was released in December 2014, starting from version 1.0. The current stable version is 3.2, which was released in September 2018.

Features: -
The following features are provided in the current stable version:

- Android-specific refactoring and quick fixes.
- Lint tools to catch performance, usability, version compatibility, and other problems.
- Pro-Guard integration and app-signing capabilities.
- Template-based wizards to create common Android designs and components
- A rich layout editor that allows users to drag and drop UI components, and the option to preview layouts on multiple screen configurations.
- Support for building Android Wear apps.
- Built-in support for Google Cloud Platform, enabling integration with Firebase Cloud Messaging (Earlier 'Google Cloud Messaging') and Google App Engine.
- Android Virtual Device (Emulator) to run and debug apps in the Android studio.
- Gradle-based build support.
- Android Studio supports all the same programming languages of IntelliJ, and PyCharm e.g. Python, and Kotlin, and Android Studio 3.0 supports "Java 7 language features and a subset of Java 8 language features that vary by platform version. External projects backport some Java 9 features.

Java Language -

Java is the name of a programming language created by Sun Microsystems in 1995. This company was bought out by Oracle Corporation, which continues to keep it up to date. The latest version is Java SE 9, which came out in 2017.

Java, which was called Oak when it was still being developed, is object-oriented, meaning it is based on objects that work together to make programs do their jobs. Java code looks like C, C++, or C#, but code written in those languages will not work in Java in most cases without being changed.

Java runs on many different operating systems, including Android, the world's most popular mobile operating system. This makes Java platform independent. It does this by making the Java compiler turn code into Java bytecode instead of machine code. This means that when the program is executed, the Java Virtual Machine interprets the bytecode and translates it into machine code.

Java Concepts

Java was developed to achieve 5 main goals. These are:
- It should be simple, object-oriented, distributed, and easy to learn.
- It should be robust and secure.
- It should be independent of a given computer architecture or platform.
- It should be very performant.
- It should be possible to write an interpreter for the language. The language should also support parallelism and use dynamic typing.

XML Language -

In computing, Extensible Mark-up Language (XML) is a mark-up language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The W3C's XML 1.0 Specification and several other related specifications all of them free open standards define XML.

The design goals of XML emphasize simplicity, generality, and usability across the Internet. It is a textual data format with strong support via Unicode for different human languages. Although the design of XML focuses on documents, the language is widely used for the representation of arbitrary data structures such as those used in web services.

Several schema systems exist to aid in the definition of XML-based languages, while programmers have developed many application programming interfaces (APIs) to aid the processing of XML data.

Firebase -

❖ Firebase is a Backend-as-a-Service that started as a YC11 start-up and grew up into a next-generation app-development platform on the Google Cloud Platform.

❖ Firebase frees developers to focus on crafting fantastic user experiences. You don't need to manage servers. You don't need to write APIs. Firebase is your server, your API, and your data store, all written so generically that you can modify it to suit most needs. Yeah, you'll occasionally need to use other bits of the Google Cloud for your advanced applications. Firebase can't be everything to everybody. But it gets pretty close.

❖ Real-time data is the way of the future. Nothing compares to it.

❖ Most databases require you to make HTTP calls to get and sync your data. Most databases give you data only when you ask for it.

❖ When you connect your app to Firebase, you're not connecting through normal HTTP. You're connecting through a Web-Socket. Web-Sockets are much, much faster than HTTP. You don't have to make individual Web-Socket calls, because one socket connection is plenty. All of your data syncs automatically through that single Web-Socket as fast as your client's network can carry it.

❖ Firebase sends you, new data as soon as it's updated. When your client saves a change to the data, all connected clients receive the updated data almost instantly.

❖ Firebase Storage provides a simple way to save binary files—most often images, but it could be anything—to Google Cloud Storage directly from the client!!!

❖ Firebase Storage has its own system of security rules to protect your G-Cloud bucket from the masses, while granting detailed write privileges to your authenticated clients.

IV.ALGORITHM

ZXing Library -ZXing (pronounced "zebra crossing") is an open-source, multi-format 1D/2D barcode image processing library that is widely used in mobile applications for reading and decoding various types of barcodes, such as QR codes, Data Matrix codes, UPC codes, and EAN codes.

The ZXing algorithm is based on a combination of image processing techniques and mathematical algorithms. It works by detecting the position and orientation of a barcode within an image, isolating the barcode, and then decoding the information contained within it. The library is written in Java, but it has ports to other programming languages such as C++, Python, and Ruby.

The ZXing library can be used for a variety of applications, such as inventory management, mobile payment, and ticketing systems. It is also commonly used in mobile apps for scanning and decoding QR codes, which have become increasingly popular for sharing links, contact information, and other types of data.

What is Google Maps? - With more than a billion active users every month, Google Maps was launched in 2005 as a desktop solution to help people get from ' point A to point B '. It's been a long run, and today, after more than 15 years, Maps has become this inevitable service that we all use on almost a daily basis.

The languages used for building the framework of Google Maps are C++, JavaScript, XML, and Ajax. From the initial desktop solution, we all have this app pre-installed on our Android phones. Well, that's enough about the Maps, and now, let's delve into the technicalities behind this app.

Which algorithm do they use? - Google Maps essentially uses two Graph algorithms – Dijkstra's algorithm and A* algorithm, to calculate the shortest distance from point A (Source) to point B (destination). A graph data structure is essentially a collection of nodes that are defined by edges and vertices.

Dijkstra's Algorithm -Dijkstra's algorithm is one of the greedy algorithms used to optimize and find the shortest path between nodes in a graph. Dijkstra's algorithm is an effective algorithm proposed by Edsger.W. Dijkstra in the year 1956 and published three years later. There exist many variants for this algorithm. The original algorithm found the shortest path between two nodes, whereas the variant fixes a single node as the source and then finds the shortest path to other nodes. And this is the concept that is implemented by Google Maps to calculate and show us the shortest path between two points. But there's one fallback to this algorithm. The number of nodes in Google Maps is almost infinite or uncountable, and this algorithm may fail due to an increase in time and space complexity. And that's where the A* algorithm proves useful.

A* Algorithm –A* graph algorithm is one of the best graph traversal and path search algorithms, formulated especially for weighted graphs. This algorithm is more preferred due to its completeness, optimality, and optimal efficiency. A* algorithm is similar to Dijkstra's algorithm and uses a heuristic function to navigate a better and more efficient path. Unlike Dijkstra's, the A* algorithm focuses on only the destination nodes and not the others; thus, this algorithm proves to be more proficient. It also takes parameters such as time requirement, distance, etc., optimizing and choosing the better nodes. So now, Google Maps also uses this algorithm to calculate the shortest path, owing to its high accuracy and ability to deal with huge chunks of data and mammoth graphs.
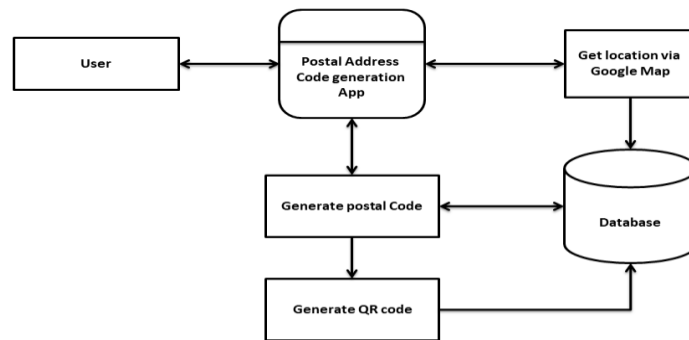
V. WORKING

Fig. Architecture Diagram

A postal code generation Android app would typically work by using a combination of algorithms and APIs to generate unique postal codes based on user input. Here's a general overview of how it could work:

User input: The user enters their address or location information into the app.

Validation: The app validates the user's input to ensure it's complete and accurate. This could involve checking for missing information such as the city, state/province, or country, as well as verifying the format of the input to ensure it conforms to the postal code system used in the relevant country.

Location lookup: The app uses a geocoding API (such as Google Maps API) to look up the latitude and longitude of the user's address or location.

Postal code generation: The app uses a postal code generation algorithm (such as the Zxing Library) to generate a unique postal code based on the user's location coordinates. The algorithm could take into account factors such as distance from other postal codes, population density, and other relevant parameters.

Displaying the postal code: Once, the app has generated the postal code, it displays it to the user. The app could also save the postal code to a database for future use.

It's worth noting that the exact implementation of a postal code generation app would depend on the specific requirements and features of the app. For example, some apps might allow users to generate multiple postal codes at once, or to search for existing postal codes rather than generating new ones.

VI. CONCLUSION

The conclusion is - With a postal code generation app, users can quickly and easily generate a postal code for any location they need, without having to manually search for the information. The app uses up-to-date and accurate information to generate postal codes, ensuring that users receive the correct information for the location they are searching for. The app can generate postal codes in a matter of seconds, making it a fast and efficient tool for users.

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