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Landmark Recognition using Image processing with MQTT protocol

Kshitij Bulkunde[1], Abhik Chakraborty[2], Sabir Kazi[3], Kajal Dhumal[4]

[1234]*B. E Student Dept. of Computer Engineering, GHRCEM, Pune, Maharashtra, India*

Abstract – *The most important necessity for any user visiting an unknown or known establishment is true information. Even using google and other searches wastes a lot of time. Asking around to people often confuses and misleads visitors. Hence, to bridge this user – information gap, a system providing complete true information to any naïve user needs to be formed. Our system takes an image as input from user and provides detailed real-time information. The image from the user will be processed and compared with the images in the database using Homography. If match found, the information related to that image will be fetched and transferred using MQTT protocol. A client side will also be provided for small entrepreneurs to update information independently. There are various reasons why MQTT can be preferred over HTPP. MQTT is much faster and more flexible. Also, it works on various levels to provide security depending on user preferences. The image can be tested against various conditions according to camera quality and environmental conditions. Further, we will be explaining the system in detail along with its future scope in the world of computer vision.*

Key Words: **Image Processing, homography, MQTT protocol, SIFT algorithm, SQLite, Template matching, Java.**

1. INTRODUCTION

The concept of Image Recognition has been around for decades and technologies have improved alongside with its help. It acts as the core for graphic and motion related applications mainly due to its performance boosting tools. It basically deals with graphical data and complex processing algorithms. Extracting useful data from images gained popularity in early 90s and invented concepts like face detection and biometric scans.

An important factor supporting this process is Storage technologies. Databases are being trained and developed to store and manage large data chunks. SQL, Mongo, oracle etc. are some to mention. Images consume a lot of data space and hence it becomes necessary to dedicate resources to support database management. Various image processing techniques require swift data interaction and faster processing algorithms with can be achieved by sophisticated database monitoring resources.

Internet Protocols, which are the backbone of data transmission over the network also help in increasing overall efficiency. Traditional HTTP has now been substituted with different protocols which are more favourable. TCP/IP was created with the advancement of internet. One such protocol is MQTT (Message Queue telemetry transfer) protocol. Developed by IBM, it is much faster and flexible

2. WORKING OF SYSTEM

The entire system is divided in three basic moules namely,

i. User module
ii. Client module
iii. Image processing system

First, the users are requested to login so as to categorize clients and App users. The user is asked to click an image which is temporarily stored in the phone memory before being transferred. The image is then transferred to the database for processing. The file transfer occurs under MQTT protocol standards. The database consist of knowledge base which helps in comparison process. Feature extraction concept comes in handy when efficient matching is needed. Image is compared with all the images in the database to assure close to accurate results. Homography is applied on the server side and it terminates when comparison process completes. After getting a match, the reference ID of the matched image is followed to the database to prepare the information for transfer. The data is then passed on to the phone on the same connection along with the image.

Concurrently, a client standalone application will be provided for entrepreneurs and small establishment owners. The application is a fill-in form simple to understand which will help them update information in real-time. Overall, any establishment can be scanned and information can be gained.

2.1 Architecture

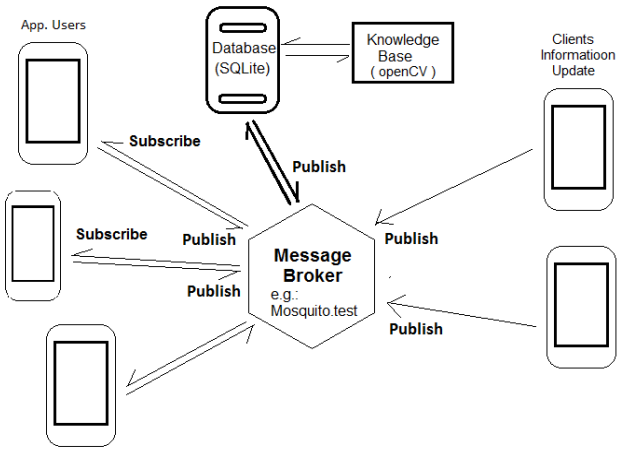


Fig -1: Architecture diagram

The entire system runs on MQTT protocol for communication. The image from the user and the data updated by the client is concurrently transferred to the SQL Database through the message broker.

2.2 MQTT Protocol

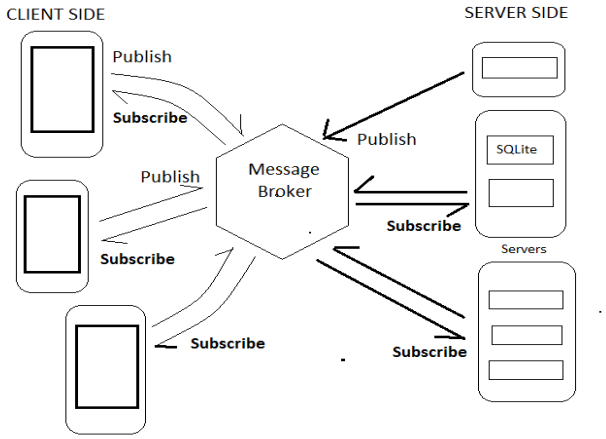
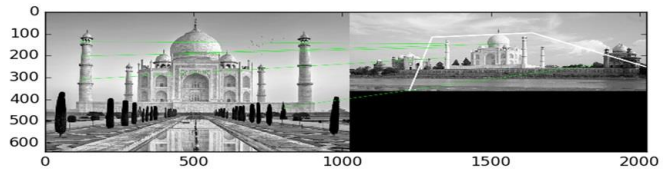


Fig -2: Working of MQTT Protocol

It was developed by IBM and is open source for developers. It works on publish-subscribe methodology. The user subscribes to a topic and the server publishes such topics continuously. Entire process is handled by the *Message Broker*. Publish–subscribe is a messaging pattern where senders of messages, called publishers, do not program the messages to be sent directly to specific receivers, called subscribers, but instead characterize published messages into classes without knowledge of subscribers. Similarly, subscribers express interest in one or more classes and only receive messages that are of interest, without knowledge of which publishers.

2.3 Homography

Deep learning algorithms were considered as traditional methods before the development of similar and more efficient algorithms. Homography is one such example which is much faster. It works on monochrome images and performs pixel to pixel matching. It is open source and developed in OpenCV.



2.4 UML Diagrams

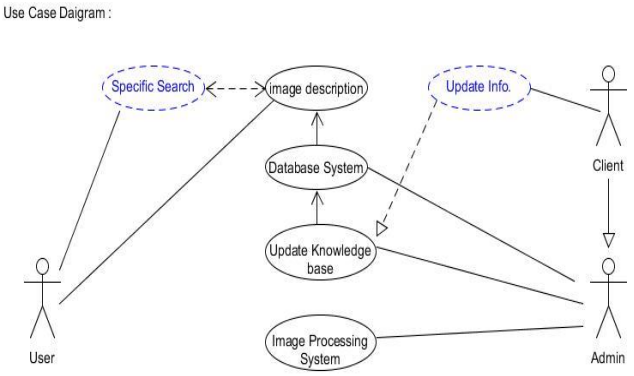


Fig -3: Use Case diagram

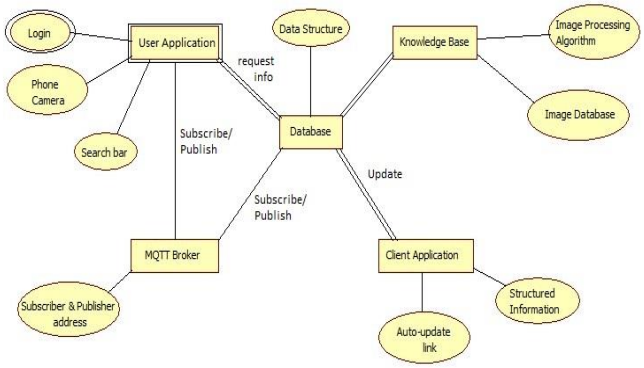


Fig -1: ER- diagram

3. CONCLUSIONS

In the future, other feature extraction methods can be looked at that may give better accuracy but require fewer dimensions. An algorithm will also need to be developed that can automatically search and obtain data from a database. The project can ultimately become part of the back-end code for a feature-recognition smartphone app.

Also, a major affecting factor for the same is the transmission of data across the network. MQTT over TCP/IP is found much more effective at present for quick transfer of messages even on a giant scale but further researches can be made for attaining maximum flexibility and boost the transactions for better real time O-T-G experience.

By using uniqueness in the picture, the time required by the app to recognize any picture will be less. This will also help app to attain high accuracy in terms of result. This app can be used in future in term of augmented reality to know the shape and structure of a particular building or monument. Even it can be used to recognize object which are used in our daily life.

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