

Image Mining of Geotagged Images Extracted from Cloud for Prediction of Next Probable Location

Vijay Bagdi, Sulabha Patil, Dr. R.V.Dharaskar

Student TPCET, Nagpur

Asst. Prof. Dept. MTech(CSE) TGPCET, Nagpur

Director MPGL, Nanded

Abstract: - We propose system that helps to find the next probable location using attributes of geotagged images. Our approach goes in direction of developing an unattended system able to extract forensically viable information embedded with geotagged images using CBIR (Content Based Image Retrieval) and using that information it predicts next probable location. We use Haar and D4 wavelet to decompose color images into multilevel scale and wavelet coefficients, with which we perform image feature extraction and similarity match by means of F-norm theory.

Keywords: - *Geotagged Images, CBIR, Image Retrieval, Prediction*

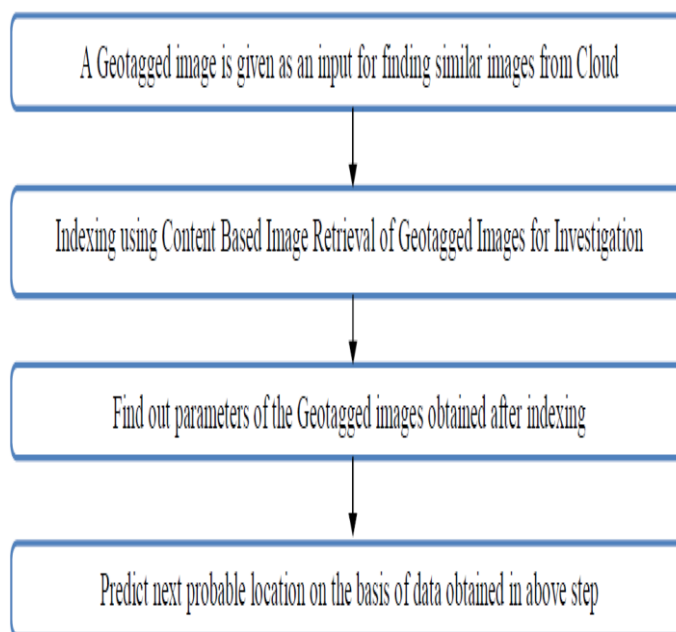
I. INTRODUCTION

Content Based Image Retrieval is process of retrieving desired images from huge database based on features of images [1]. . Over the past four years, tourist databases have received particular attention and have been featured on the front page of newspapers. These databases have proven extremely useful in verifying or falsifying the involvement of a person or an object as a source of evidence material in a crime, and have led to the resolution of old cases [7]. Tourist databases are also playing an increasingly prominent role in the forensic literature. Research into forensic image databases is a rapidly expanding field of scientific endeavor that has a direct impact on the number of criminal cases solved. Throughout the 20th century, many databases were available in the form of paper files or photographs.

This project addresses the growing need for incorporating scientifically based approaches to conducting forensic analysis in the digital world rather than developing digital technologies and then adapting them to benefit from forensic analysis techniques.

This paper focused on digital forensic for finding out next probable location of an individual using CBIR as forensic tool.

II. PROPOSED METHODOLOGY



III. PROPOSED ALGORITHM

1. Get GPS information from input image
2. Calculate cluster and dist of image from content.
3. From the above information get the matching history data using MYSQL query :-
`Select *,3956 * 2 * ASIN(SQRT(POWER(SIN((" + historyData.getLat()+ " - abs(lat)) * pi()/180 / 2),2)+ " + "COS(" + historyData.getLat() + " * pi()/180) * COS(abs(lat) * pi()/180) * POWER(SIN((" + historyData.getLng()+ " - lng) * pi()/180 / 2), 2))))" + " as distance From history_tbl having distance < 20 ORDER By distance`
4. Find the matching cluster data, from cluster present in cloud (passed input as 'searched image')
5. First collect image result data from matching db data (step 3 input)
6. Now remove matching imgResultDb form searchForNextLocation result (removed the matching images 4 & 5)
7. Collect history data from filter images (input pass 6)
8. Find next location (input 1 and 7)

IV. EXPERIMENTS AND RESULTS

4.1 Performance evaluation

The performance of retrieval system is measured using the standard procedure in terms of the precision and recall values [5]. Recall measures the ability of the system to retrieve all the models that are relevant, while precision measures the ability of the system to retrieve only the models that are relevant. They are defined as

$$\text{Precision (P)} = \frac{\text{Number of relevant images retrieved}}{\text{Total number of images retrieved}}$$

$$\text{Recall (R)} = \frac{\text{Number of relevant images retrieved}}{\text{Total number of relevant images}}$$

The number of relevant items retrieved is the number of the returned images that are similar to the query image in this case. The number of relevant items in the collection is the number of images that are in the same particular category with the query image. The total number of items retrieved is the number of images that are returned by the search engine [2].

	Precision Rate (Top 5)	Precision Rate (Top 10)
Vijay	1	1
Sanket	1	0.9
Jitesh	1	1
Vishal	1	0.9
Amit	0.8	0.7

Table 4.1.1: Precision Rate for Top 5 and Top 10 images

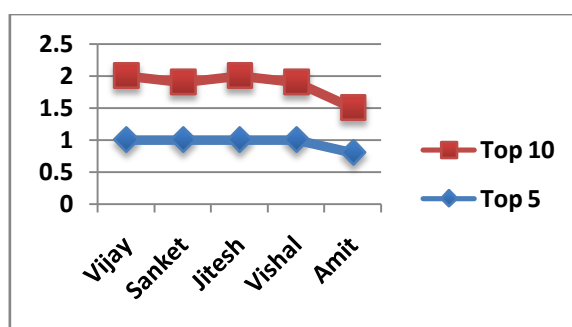


Figure 4.1.1: Precision Rate for Top 10 and Top 5 images

	Retrieval Speed (s)
Vijay	2.9
Sanket	3.8
Jitesh	2.3
Vishal	4.7
Amit	4.2

Table 4.1.2: Retrieval Speed

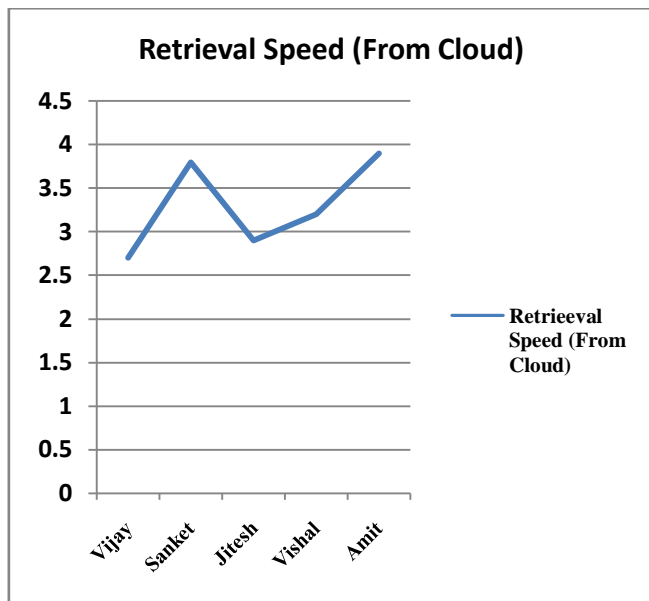


Figure 4.1.2: Graph Showing Retrieval Speed in Sec (From Cloud)

4.2 Experimental Results



Figure 4.2.1: Vijay Query, 10 matches from top 10 retrieved images



Figure 4.2.2: Sanket Query, 10 matches from top 10 retrieved images



Figure 4.2.3: Jitesh Query, 10 matches from top 10 retrieved images



Figure 4.2.4: Vishal Query, 10 matches from top 10 retrieved images



Figure 4.2.5: Amit Query, 10 matches from top 10 retrieved images

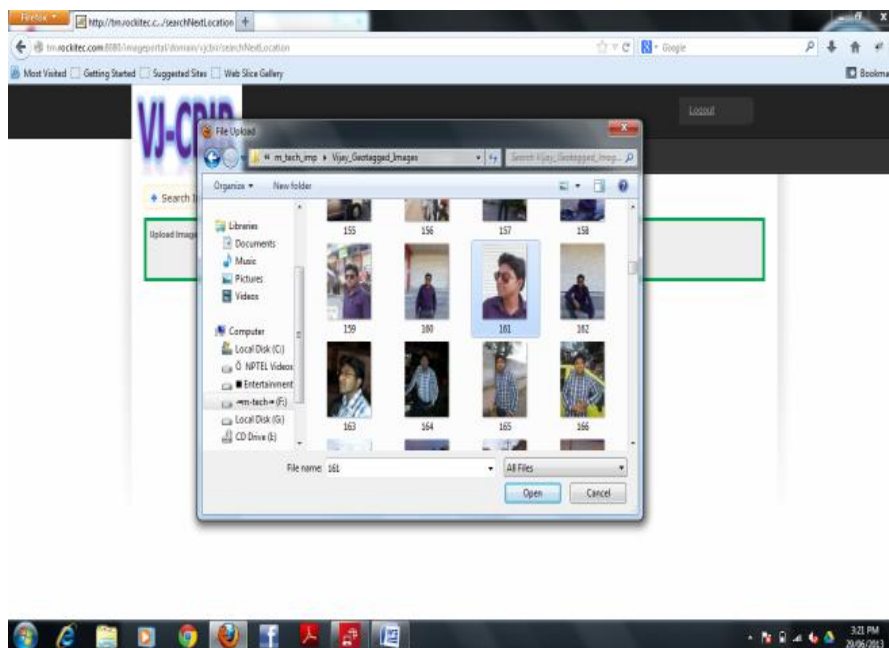


Figure 4.2.6: Selection of Input Image

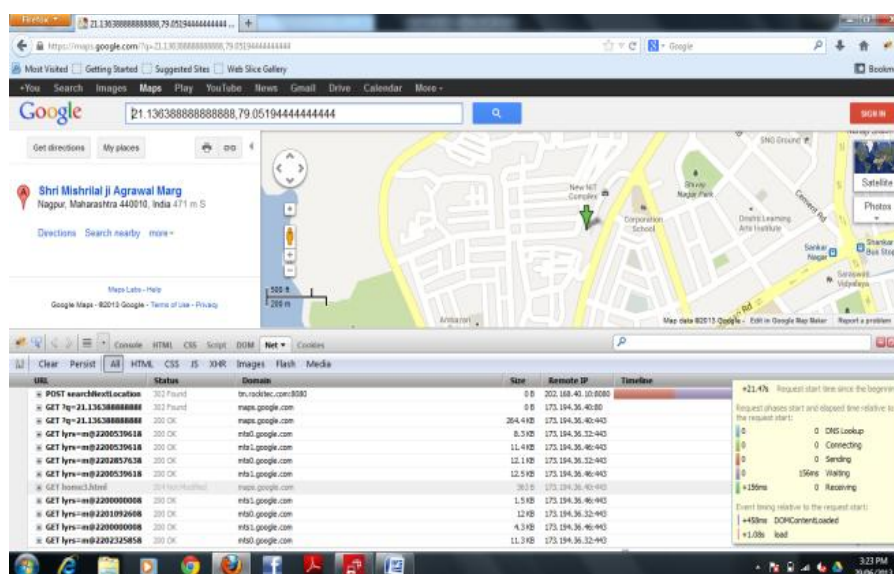


Figure 4.2.7: Retrieved Predictive Next location

V. CONCLUSION

CBIR approach via wavelet decomposition of images, followed by feature extraction and similarity match under F-norm theory. We compared the retrieval performance of D4 Wavelet, Haar wavelet schemes with the existing technique wavelet histograms. It turns out that D4 wavelet has greatly speeded retrieval as well as ensured enough recall rate comparable with its Haar wavelet and wavelet histogram. In addition, the progressive retrieval strategy helps to achieve flexible compromise among retrieval indices.

Finally we conclude from the results that wavelets achieve high retrieval performance in real time CBIR systems which will used in digital forensic [11]

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