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Photo Based Location Information Services Using Encryption Free Framework with Duplicate Checking

M. Chandraleka[1], Mrs.D. Anitha[2]

[1]PG Student,Department of computer science and engineering, Government College of Engineering, Tirunelveli, Tamil Nadu, India

[2]M.E., Assistant Professor,Department of computer science and engineering, Government College of Engineering, Tirunelveli, Tamil Nadu, India

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ABSTRACT

In mobile, many applications provide services to the users based on the photos provided by the user.Certain applications, client users take a photo of a certain spot and send it to a server, the server identifies the spot with an image recognizer and returns its related information to the users.It can cause a privacy issue because image recognition results are sometimes privacy sensitive.To overcome the problems of existing approaches, proposed an Encryption-Free framework for Privacy preserving Image Recognition, called Enfpire.InEnfPire, the server cannot identify the client users current location, its candidates can only be presented. In proposed thefeature extraction with CNN algorithm help to collect the unique and accurate features from input image and also used Duplicate Detection process to detect images with same features present within same index.In proposed approach user transform the extracted image feature x into y on the user server and sends it to the public server.With the transformation , the effectiveness of the original feature x is degraded so that the public server cannot uniquely recognize the spot-ID of user from y.It only retrives the relevant spot ID's.The unique spot ID will identify and information regarding the spot and relevant images will be given to the user.

Keywords: CNN, Feature extraction, Feature Transformation, Information retrieval.

I. INTRODUCTION

Mobile devices are very common and widely used all over the world.There are lot of free or expensive services and applications working on smartphones.Mobile security is the protection of portable devices such as laptops, smartphones, tablets from threats. The developer needs to implement secure communication between their mobile application and their server. With the development of sniffing tools it is easy for an attacker to sniff communications between the mobile device and public Wi-Fi hotspot. If the connections are not secure, then the attacker can steal sensitive data from

the user. If developer setup weak SSL for their applicationserver communications then the attacker can perform Man-In-The Middle (MITM).

Data are the important asset of all organization. Duplicate detection is serious problem in many applications, including customer relationship management, personal informationmanagement.It is the process of identifying various representations of a same real-world objective in a information source. Nowadays duplicate detection methods need to process larger datasets in shorter time.Duplicate detectionis a technique for eliminating duplicate copies of repeating data. This technique is used to improve storage utilization and can also be applied to network data transfers to reduce the number of bytes that must be sent.

Indexing is a way to optimize the performance of a database by minimizing the number of disk accesses required when a query is processed. Indexes are used to quickly locate data without having to search every row in a database table every time a database table is accessed. Indexes can be created using one or more columns of a database table, providing the basis for both rapid random lookups and efficient access of ordered records. Indexing is an important process in Information Retrieval (IR) systems.Indexing reduces the documents to the informative terms contained in them. It provides a mapping from the terms to the respective documents containing them.

Client-server based information services like the one developed advantageous in that they can provide the latest information only by updating the server's information database and recognition criteria.In this work the service is provided in a certain public space where only a limited number of spots are included. A service provider knows how many and what kind of spots exist in the field.

The client users locations are represented as a spot-ID, in the mobile services based on GPS the users locations are represented as a numerical coordinate. There have been proposed a lot of methods for protecting the numerical location data. These methods can be classified into three types:

- ✓ cloaking area-based
- ✓ transformation-based
- ✓ dummy-based.

The cloaking area-based methods assume a trusted third party, which mediates interactions between the server and the users. Based on a set of the exact locations sent from each user, the third party clusters it into several subsets and creates a cloaking area for each subset. The cloaking area includes all the exact locations in the corresponding subset. Then the party sends the information of each cloaking area to the server. Since the users' exact locations are spatially abstracted, the servercannot find them. However, this methods are disadvantageous in that it is difficult to prepare such a third party in practice.

In the transformation-based methods the users transform their exact location coordinate into another coordinate before sending it to the server. A typical approach is to replace the exact location coordinate with that of a certain near-by landmark such as an intersection or a building. However, these methods seriously degrade the quality of mobile services if there are no appropriate landmarks around the users' exact location.

In the dummy-based methods the users generate dummy locations differing from their actual location and send them all together to the server. After receiving the locations, the server prepares the information related to each received location and returns it to the users. Finally, the users choose the truly useful information related to their actual location. These methods are currently the

mainstream since it is simple and practical.

The Cloaking area-based and dummy-based method cannot be direrctly applied to photo based information services since location data is not a numerical coordinate.But the Transformation–based method are transform the exact location Coordinate.

In this paper to propose an Encryption-Free framework for Privacy-preserving Image Recogniton called EnfPire, to a privacy preserving framework for image retrieval. EnfPire does not impose any restrictions on the servers recognition algorithm.

The paper is organized as follows:Section II to discuss the related work of proposed system, Section III to discuss the implement of proposed system, and also discuss the feature extraction, feature transformation, Image recognizer, Information Retrieval.In addition , to experimentally discuss the performance evaluation.

II. RELATED WORK

M.Koskela et al.[1] proposed an scene recognition and show that convolutional networks trained on mostly object recognition data can successfully be used for feature extraction.And also train a total of four networks with different training data and architectures.The proposed method combining multiple scales and multiple features obtains state-of the-art performance on four standard scene datasets. The CNN activation features have a great promise as universal representation for various image classification and retrieval tasks. CNN activation features extracted on multiple scales, with the current state of-the-art performance reported on several datasets, can be considered as an alternative approach for this purpose. On the other hand, combining several CNNs can also result in a performance gain as was demonstrated in the experiments of this paper.The variety of the used CNNs would be larger better results can be expected.

Y.Jia et al.[2] proposed an Caffe layer it is the essence of a neural network layer takes one or more blobs as input, and yields one or more blobs as output. Layers have two key responsibilities for the operation of the network as a whole: a forward pass that takes the inputs and produces the outputs, and a backward pass that takes the gradient with respect to the output, and computes the gradients with respect to the parameters and to the inputs, which are in turn back-propagated to earlier layers. Caffe layer also provides a complete set of layer types including: convolution, pooling, inner products, nonlinearities like rectified linear and logistic, local response normalization, elementwise operations, and losses like softmax and hinge. These are all the types needed for state-of-the-art visual tasks. Coding custom layers requires minimal effort due to the compositional construction of networks. Learning Semantic Features in addition to end-to-end training, Caffe can also be used to extract semantic features from images using a pre-trained network. These features can be used “downstream” in other vision tasks.The dimensional embedding of all the ImageNet validation images, colored by a coarse category that they come from. The nice separation testifies to a successful semantic embedding. Intriguingly, this learned feature is useful for a lot more than object categories..But this Caffe method doesn’t having many hooks for integrating with other systems.

H.Kido et al.[3] implement the anonymous communication technique to protect the location privacy of the users of location-based services. And also proposed a cost reduction technique for communication with our anonymous technique.The service procedure from beginning to end is as follows: 1. An LBS user obtains the true position data of a user using a positioning device such as GPS. 2. The user sends the position data to a service provider. 3. The service provider creates a reply message that rc-sponds to the received position data and sends it to

the user. 4. The user receives a replymessage.To evaluate the technique, implemented a simulation system experiment using 39 rickshaw trajecto- ries in Nara City, Japan. From the results of the experiments, conclude that the technique can be applied into practical LBSs.But the services are sometimes hacked by other server.

Xie et al.[4] propose an combine CNN with dictionary based models for scene recognition and visual domain adaptation. Specifically, based on the well-tuned CNN models e.g., AlexNet and VGG Net two dictionary-based representations are further constructed, namely mid-level local representation (MLR) and convolutional Fisher vector representation (CFV). In MLR an efficient two-stage clustering method, weighted spatial and feature space spectral clustering on the parts of a single image followed by clustering all representative parts of all images. In CFV a multi-scale and scale-proportional GMM training strategy is utilized to generate Fisher vectors based on the last convolutional layer of CNN. By integrating the complementary information of MLR, CFV and the CNN features of the fully connected layer, the state-of-the-art performance can be achieved on scene recognition and domain adaptation problems. By combining the complementary information in MLR, CFV, and FCR, a hybrid feature representation can be generated which is much more accurate than the traditional CNN features. In CNN Model to use CFV and MLR to experiment on scene recognition and domain adaptation to demonstrate the excellent performance of hybrid model, hence does not given the memory requirement of the Indexing structure.

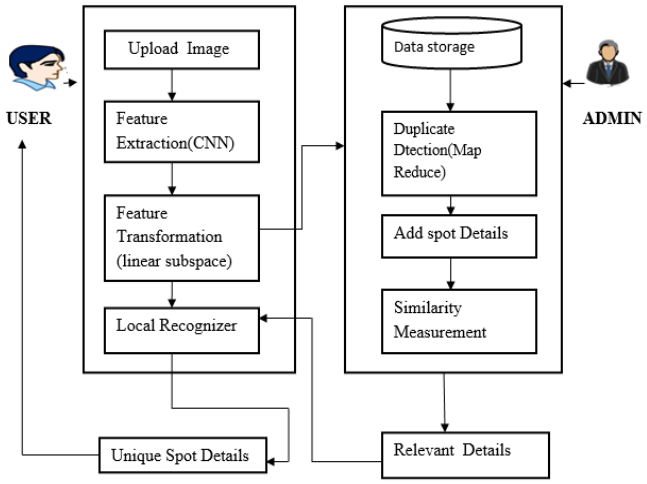


Figure1. Photo based Information services

III. PROPOSED FRAMEWORK

In this approach the client userslocations are represented as a spot-ID. The mobile services based on GPS, the userslocations are represented as a numerical coordinate. There have been proposed a lot of methods for protecting the numerical location data. In the transformation-based methods, the users transform their exact location coordinate into another coordinate before sending it to the server. To replace the exact location coordinate of a certain near-by landmark such as an temple or a building.

The service provider creates a server system consisting of a database and an image recognizer.In the database, related information for each spot such as a product list, bargain products, customer evaluations and congestion level is stored and updated in realtime. To get the information, client users take a photo of the spot, extract a visual feature from the photo, and send it to the server using their own smartphone.When receiving the visual feature from the users, the server recognizes the spot in the photo using the image recognizer and returns the corresponding information in the database totheusers.It means the userscurrent location is

disclosed to the server in terms of spot ID at the spot-recognition stage on the server side.

Moreover, when the users send a visual feature of the photo to the server, some identifiers of the users smartphone are also sent automatically It can be used by the server for making a correspondence between current and past results of spot-recognition. Not only the users current location but also their location history is disclosed to the server. Because the location history can be viewed as the usersprivacy information that reflects their interests and preference, it should be protected.

Majority of the computationally intensive jobs are handled by the cloud, and a querier can now simply send the query and receive the result. Specially, to deal with massive images, to design the system suitable for distributed and parallel computation and introduce several optimizations.

Proposed system also support the Duplicate detection method to eliminating the duplicate copies of repeating data and to improve the storage utilization.In Indexing are used to quickly locate data without having to search every row in a database table.Finaly sharing the information to users with privacy-preservation.

DUPLICATE DETECTION

In the proposed approach concentrate on indexing multimedia image contents. Images are collected and indexed with the help of Map Reduce algorithm. Firstly images are processed using pre processing and feature extraction techniques. After that features are matched with the already stored images. If image features was same like already presented image that will not be stored. This helps to improve the efficiency of image storage. If image had unique features that will be store under the specific label or index.

FEATURE EXTRACTION

Feature extraction is a type of dimensionality reduction that efficiently represents interesting parts of an image. Grayscale conversion, inversion, smoothing can be done in preprocessing before the extraction. CNN (Convolutional Neural Network) can be used to extract image features.

In our proposed CNN structure, multiple features can be extracted from each original eye data, and each feature has $n3$ dimensions

Constructing the CNN Model

Step 1:function INITCNNMODEL (θ, [$n1$–5])
Step 2:layerType = [convolution, max-pooling, fully-connected, fully-connected];
Step 3:layerActivation = [tanh(), max(), tanh(), softmax()]
Step4:model = new Model();
Step 5:for$i$=1 to 4 do
Step 6:layer = new Layer();
Step 7:layer.type = layerType[i];
Step 8:layer.inputSize = ni
Step 9:layer.neurons = new Neuron [ni+1];
Step 10:layer.params = θi;
Step 11:model.addLayer(layer);
Step 12:end for
Step 13:return model;
Step 14:end function

Training the CNN Model

Initialize learning rate α, number of max iterationITERmax, min error ERRmin, training batchsBATCHEStraining, bach size SIZEbatch, and so on;

Step 1: Compute $n2$, $n3$, $n4$, $k1$, $k2$, according to $n1$ and $n5$;
Step 2: Generate random weights θ of the CNN;
Step 3:cnnModel = InitCNNModel(θ, [$n1$–5]);

Step 4:iter = 0; err = +inf;
Step 5:while err >ERRmin and iter<ITERmax do
Step 6:err = 0;
Step 7:forbach = 1 to $BATCHES_{training}$ do
Step 8: $[\nabla(\theta), J(\theta)]$ = cnnModel.train (TrainingDatas, TrainingLabels), as (4) and (8); Update θ using (7);
Step 9:err = err + mean($J(\theta)$);
Step 10:end for err = err/$BATCHES_{training}$;
Step 11:iter++;
Step 12:end while

Save parameters θ of the CNN

FEATURE TRANSFORMATION

In feature transformation the extracted feature from images **X** into **Y** on the user's server and sends it to the public server. With the transformation, the effectiveness of the original feature **X** is degraded so that the server cannot uniquely recognize the spot-ID. The original feature **X** is not disclosed to the server because the transformation is done on the user side. Because **Y** is less effective, the server does not uniquely recognize the spot-ID. Features are transformed into two categories called visual features and image properties features.

Linear Transformation

First, automatically generated features are not appropriate because such features tend to be dissimilar with the actual features of any *spot*, which can be easily guessed as dummy. Second, the features contained in *F* are not appropriate because *F* is available for not only the users but also the server, which can easily judge whether the sent feature is in *F* or not. Third, client users who are first-time visitors to the *field* would have no actual images of the *spots*.

Considering these constraints, here propose to use the transformed version of any $\boldsymbol{f}$ *to F*, i.e.,

$$\boldsymbol{g} = LL^{T}\boldsymbol{f}(\text{transformed feature})$$

Due to the lack of knowledge of *L*, the server cannot find that $\boldsymbol{g}$ was obtained by transforming $\boldsymbol{f}$. Moreover, the recognition likelihood for $\boldsymbol{g}$ has the same tendency with that for the actual requests $\boldsymbol{y}$ due to the use of the same *L*. Hence, it is difficultfor the server to distinguish which of the sent features are dummy.

IMAGE RECOGNIZER

The recognizer increases the server spot-recognition performance; it is not desirable from the aspect of privacy protection. This approach should provide a transformation method that makes the server unable to judge whether visual features sent from the users are original version or transformed version. K-Nearest Neighbor algorithm used for predicts distance between query image and stored image dataset. The image which has nearest matching features with query image that will be shown to the user.

Processing Steps

Input: Face image with extracted features.

Output: Classification for authority checking.

Processing Steps:

Step 1: Calculate "d(x, x_i)" i =1, 2, ….., **n**; where **d** denotes the Euclidean distance between the points.

Step 2: Arrange the calculated **n** Euclidean distances in non-decreasing order.

Step 3: Let **k** be a +ve integer, take the first **k** distances from this sorted list.

Step 4: Find those **k**-points corresponding to these **k**-distances.

Step 5: Let k_i denotes the number of points belonging to the i^{th} class among **k** points i.e. $k \geq 0$

Step 6: If $k_i > k_j \; \forall i \neq j$ then put x in class i.

INFORMATION RETRIEVAL

When receiving the visual feature from the users, the server recognizes the spot in the photo using the image recognizer and returns the corresponding information in the database to the users. similarity based recognition method on the server side, whereas employed closest detection algorithm for a recognition method on the user side. If I is the database image and query image, then the similarity measure is computed as follows,

Step 1: Calculate histogram vector vI and of the database images cI.
Step 2: Calculate the vectors vI and cI for the query image also.
Step 3: The Minkowski distance between two feature vectors can then be used as the similarity measurement.
Step 4: If $d \leq \tau$ (threshold) then the images match.

IV. EXPERIMENTAL RESULTS

For image matching and recognition, features are first extracted from a set of reference images and stored in a database. For feature extraction process, CNN could be implemented. The layers of the CNN algorithm help to collect the unique and accurate features from input image.

During Transformation, the image features are transformed using linear transformation technique. This will helps to hide the original feature values from the public server.

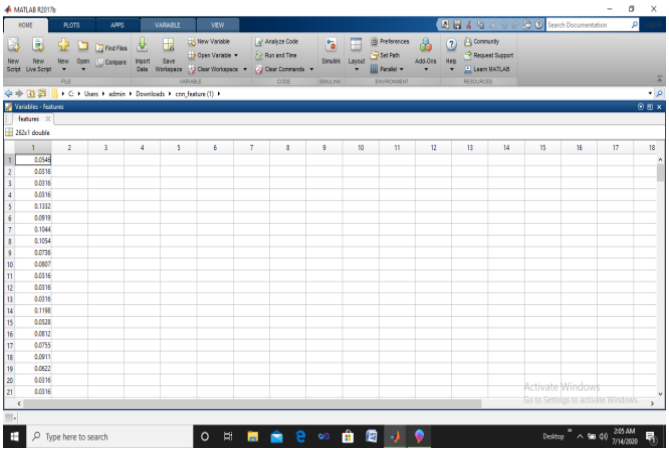
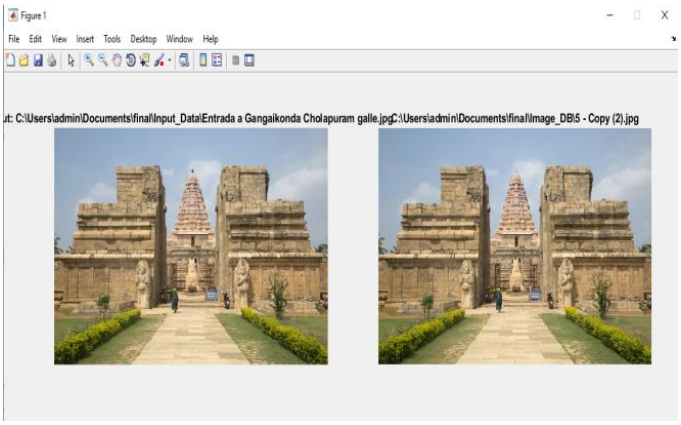
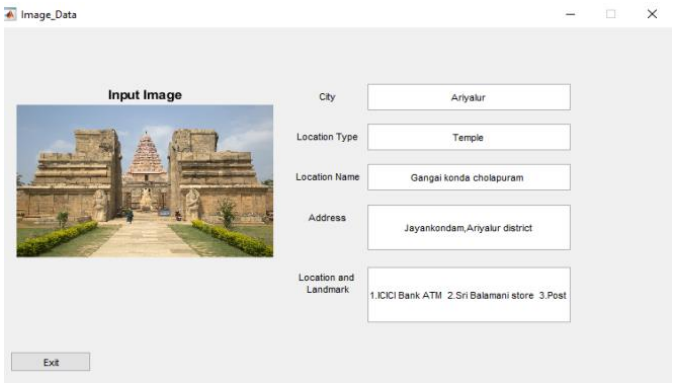


Image recognition is the process of predicting similar image in database. The features of image should compare with database and show the relevant image that present in the same location.The recognizer increases the server spot-recognition performance.K-Nearest Neighbor algorithm used for predicts distance between query image and stored image dataset.



The selected image should compare with database and retrieving the location information from service provider.



V. CONCLUSION

In this work on EnfPire framework is proposed for photo-based information services.In Existing photo based information services, a server can easily recognize client users current location. To protect the location information, EnfPire abstracts it using a linear subspace-based feature transformation. Because Enfpire does not rely on cryptographic techniques, it alloea the use of various recognition algorithms on the server side.In feature extraction the CNN algorithm help to collect the unique and accurate features from input images. And also used Duplicate Detection process with Map-Reduce algorithm to detect images with same features present within same index using mapper function and eliminate the repeated image using reduce function. Similarity comparison, extracting featureof every image based on its pixel values and defining rules for comparing images. Distance metric or matching criteria is the main for retrieving similar images fromimage databases for all the search purpose.

Most of the storage systems does not take responsibility of secure storage.To enhance the security of the image an encryption methodology can be added and also enhance the more services from every image.To increase the various method for feature transformation.

VI. REFERENCES

[1] M.Koskela et.al[2],proposed "Convolutional network features for scene recognition," in Proceedings 22nd ACM International Conference Multimedia, 2014.

[2] B. Lee et.al[3],proposed "Protecting location privacy using location semantics," in Proceedings 17th ACM International Conference Knowledge Discovery Data Mining, 2011.

[3] Y. Zhang et.al[3],proposed "Preserving user location privacy in mobile data management infrastructures," in Proceedings 6th International Workshop Privacy Enhancing Technology, 2006.

[4] F.C.Chang et.al, proposed "A privacy-preserving bipartite graph matching framework for multimedia analysis and retrieval," in Proceedings 5th ACM Internatioanl Conference Multimedia Retrieval., 2015.

[5] Y. Jia et al.,proposed "Caffe: Convolutional architecture for fast feature embedding," in Proceedings 22nd ACM International Conference Multimedia, 2014.

[6] H. Kido et.al[2],proposed "An anonymous communication technique using dummies for location-based services," in Proceedings International Conference Pervasive Services, Jul. 2005.

[7] S. Mika et.al[4],proposed "Fisher discriminant analysis with kernels" in Proceedings Neural Network Signal Process,1999.

[8] A.R.Sadeghi et.al.,proposed "Efficient privacypreserving face recognition" in Proceedings of the 12th International Conference on Information Security Cryptology,2009.

[9] B. Zhou et.al[4],proposed"Learning deep features for scene recognition using places database" in Proceedings 27th International

Conference Neural Information Process System, 2014.

[10] L. Weng et.al[3],proposed"A privacy-preserving framework for large-scale content-based information retrieval," IEEE Transactions Information Forensics Security, 2015.

[11] Xie et.al[4] Proposed "Hybrid CNN and dictionary-based models for scene recognition and domain adaptation" IEEE Transactions on Circuits and System for Video Technology,2017.

[12] Krizhevsky et.al[3], Proposed "Image net classification with deep convolutional neural networks" in Proceedings of the 25th International Conference on Neural Information Processing System,2012.

[13] Agrawal et.al[3], proposed "Analyzing the performance of multilayer neural networks for object recognition" in proceedings of 13th European Conference on computer vision,2014.

[14] Liang et.al[3], Proposed "Recurrent convolutional neural network for object recognition" in Proceedings of the 28th IEEE Conference on Computer Vision,2015.

[15] K.Nakamura et.al[2], Proposed "A Framework of Privacy-Preserving Image Recognition for Photo-Based Information Services" IEEE Transaction on Information Forensics,2017.

[16] C.-Y. Hsu, C.-S. Lu, and S.-c. Pei, "Image Feature Extraction in Encrypted Domain With Privacy-Preserving SIFT," IEEE Trans. Image Process., vol. 21, no. 11, pp. 4593–4607, 2012.

[17] L. Zhang, T. Jung, C. Liu, X. Ding, X.-Y. Li, and Y. Liu, "Pop: Privacy-preserving outsourced photo sharing and searching for mobile devices," in ICDCS. IEEE, 2015.

[18] M. Daneshi and J. Guo, "Image reconstruction based on local feature descriptors," 2011.

[19] Z. Qin, J. Yan, K. Ren, C. Chen, and C. Wang: "Towards Efficient Privacy-Preserving Image Feature Extraction in Cloud Computing," inProceedings of the 22nd ACM International Conference on Multimedia, pp.497–506, 2014.

[20] Z. Qin, J. Yan, K. Ren, C. Chen, and C. Wang: "SecSIFT: Secure Image SIFT Feature Extraction in Cloud Computing," ACM Transactions on Multimedia Computing, Communications, and Applications, Vol.12, No.4, 2016.

[21] C. Hsu, C. Lu, and S. Pei: "Image Feature Extraction in Encrypted Transactions on Image Processing Domain with Privacy-Preserving SIFT," IEEE, Vol.21, No.11, pp.4593–4607, 2012.

[22] W. Chu and F. Chang: "A Privacy-Preserving Bipartite Graph Matching Framework for Multimedia Analysis and Retrieval," in Proceeding of the 5th ACM International Conference on Multimedia Retrieval, pp.243–250, 2015.

[23] M. Kantarcıoglu and C. Clifton: "Privately Computing a Distributed k-NN Classifier," in Proceedings of the 8th European Conference on Principles of Data Mining and Knowledge Discovery, 2004.

[24] Ji Zhang "Efficient and Effective Filtering of Duplication Detection in Large Database Applications", JOURNAL OF SOFTWARE, vol. 7, no. 11, november 2012.

[25] Jeffrey Dean and Sanjay Ghemawat "MapReduce: Simplified Data Processing on Large Clusters", OSDI2004.

[26] Raquel. C. Conceicao "A Comparison of Map Reduce and Parallel Database Management Systems", ICONS 2013: The Eighth International Conference on Systems.

[27] Y.-W. Shou and C. T. Lin, "Image descreening by GA-CNN-Based eof feature curves between Texture Classification," IEEE Trans. on circuits and system I, vol. 51, pp. 2287-2299, 2004.

[28] S. Shrestha and L. Vanneschi, "Improved Fully Convolutional Network with Conditional

Random Fields for Building Extraction," Remote Sensing, vol. 10, 2018.

[29] Y. Xu, L. Wu, Z. Xie, and Z. Chen, "Building Extraction in Very High Resolution Remote Sensing Imagery Using Deep Learning and Guided Filters," Remote Sensing, vol. 10, 2018.

[30] Maoguo Gong, Jiaojiao Zhao, Jia Liu, Qiguang Miao, and Licheng Jiao, “Change detection in synthetic aper- ture radar images based on deep neural networks,” IEEE Transactions on Neural Networks and Learning Sys- tems, vol. 27, pp. 125–138, Jan2016.

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