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DocFace+: ID Document to Selfie* Matching

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ABSTRACT

In our day to day life there are many activities that involve verification of our identity by providing our ID documents with face images such as driving license, aadhar card, and passport to human operators. In the method of gradient based optimization, the convergence is slower because of the classifier weights are unfitted. It occurs when the classes have fewer samples as a property of existing dataset of ID selfies. To avoid this bottleneck, we propose the dynamic weight imprinting method that updates the weights of classifier to allow swift convergence and its representations are more generalizable. To learn a combined face representation with domain based parameters, a pair of sibling networks is used with sharing of parameters partially. When the dataset contains ID-selfies are cross validated, it shows that a publicly accessible face matcher (Insight Face) achieves only a TAR (True Accept Rate) of 88.77 1.32% at false rete of acceptance in 0.01% on a problem. The proposed method improves the TAR to 95.9695 ± 0.54%.

Keywords: *Dynamic Weight Imprinting, Gradient Based Optimization, Cross Validation.*

1. Introduction

In our day to day life there are many activities that involve verification of our identity by providing our ID documents with face images such as driving license, aadhar card, and passport to human operators [1]. But this is a slow process, requires many labours and unreliable. An efficient system is required for matching the ID document pictures to live selfies (face images) with increased level of accuracy [12],[13]. To meet this objective, we propose a method called DocFace+. In the method of gradient based optimization, the convergence is slower because of the classifier weights are unfitted. It occurs when the classes have fewer samples as a property of existing dataset of ID selfies [2]. To avoid this bottleneck, we propose the dynamic weight imprinting method that updates the weights of classifier to allow swift convergence and its representations are more generalizable. To learn a combined face representation with domain based parameters, a pair of sibling networks is used with sharing of parameters partially [7]. When the dataset contains ID-selfies are cross validated, it shows that a publicly accessible face matcher [6]. There are more than 80% of the classification models and just regression models of 15-20% in the analytics of four years. The reason for this bias in these classification models is the most analytical problem in decision making. For example, will a customer attrite or else, should we target a customer have a high potential or not, etc. This is a more in sighted analysis and it directly links to a road map of implementation [5]. In this paper, we will discuss about a widely classified technique called K-nearest neighbours (KNN) [8] [9].

Our primary focus will be on how KNN algorithm works and how it effects in parameters of input/output in prediction. KNN is useful for both regression predictive and the classification

problems [10]. However, it is used more in the problem of classification in industry. To evaluate this technique, we require these 3 important aspects:

- The interpretation of output
- Less computation time
- Increased power of prediction

Let us take an example for placing KNN in the scale:

	Logistic Regression	CART	Random Forest	KNN
1. Ease to interpret output	2	3	1	3
2. Calculation time	3	2	1	3
3. Predictive Power	2	2	3	2

Fig.1

Across all the considered parameters, the KNN algorithm works fine. It is a commonly used technique as it is very easy for interpretation and less time for computation.

2. Existing system

In the existing system, the verification of identity plays a vital role in our daily life [4]. For instance, physical security, access control, and access for crossing international borders in security level [1]. In order to verify us we need to show our photo IDs such as driving license, passports and aadhar card to the human operators. But this process is time consuming and requires high manpower [13]. Such an automated system requires document images to selfies (live face images) with high accuracy and works in real time [15]. The gate will be automatically opened after the verification of traveller's identity [11]. They will compare the scanned or digital document image for selfie ID matching.

Drawbacks

- The main problem in selfie ID matching is it poses many challenges which are different from the generalized face recognition. For tasks in unconstraint and the challenges in pose, illumination and expression (PIE) in variations.
- The face images are low in quality due to 1) compression of image and 2) the large gap in time between the document's issue date and date of verification hat remains as a primary difficulty.

3. Proposed System

We propose to use a certificate system which is based on block chain to overcome this problem. If one wish to modify a particular datum internally then it is must to request that other nodes to modify simultaneously as data are stored in different nodes. So, this system is highly reliable decentralized application and Ethereum block chain is used for certificate system design. This was selected as it is encrypted, incorruptible, and trackable and allows data synchronization. These features are integrated to improve the efficiency of block chain system in each stage of operations. It provides reliable and accurate information on digital certificates and compares user live face with verified documents face by saving on paper, prevent document forgery, cuts management costs.

4. Requirements

The identity verification plays a vital role in our daily life. For instance, physical security, access control and crossing borders need us to verify for security level access of our identity. A general and practical approach to this problem requires comparing an individual's face image in his/her ID document with live face. For example, customs officials look at passport image for verification during immigration. The clerks at a supermarket in India look at the face of customer and the driving license to check his/her information when the customer is purchasing.

Scenarios of ID document face image matching can be found and applied in numerous areas. However, when it is conducted by humans manually at its primary, it is costly, prone to operator error and time consuming.

Hardware:

Hard Disk : 80GB and Above

RAM : 4GB and Above

Processor : P IV and Above

Software:

Windows 7 and above

JDK 1.7

J2EE

Tomcat 7.0

MySQL

Technology:

J2EE (JSP, Servlet), JavaScript, HTML,

CSS, AJAX.

Hibernate Framework

MVC Pattern

Design Pattern

5. System Design

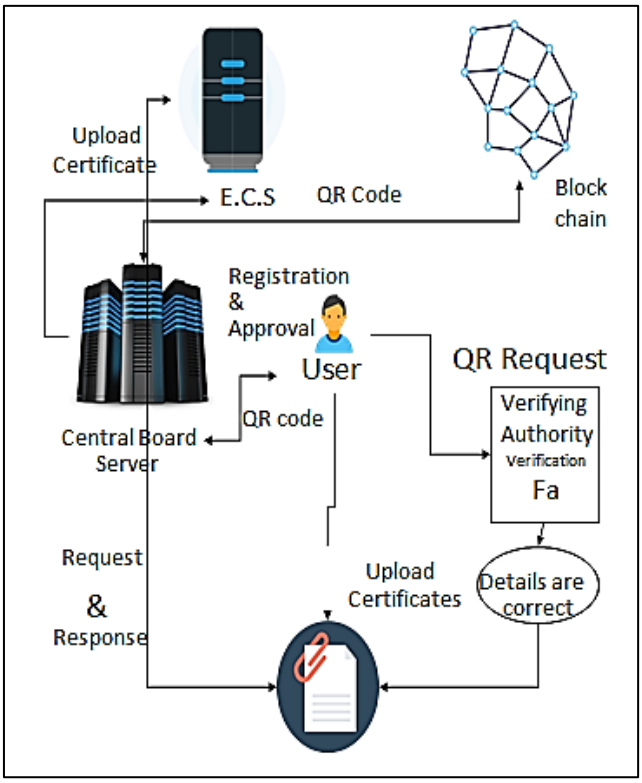


Fig.2

We propose to use a certificate system which is based on block chain to overcome this problem. If one wish to modify a particular datum internally then it is must to request that other nodes to modify simultaneously as data are stored in different nodes. So, this system is highly reliable decentralized application and Ethereum block chain is used for certificate system design. This was selected as it is encrypted, incorruptible, and trackable and allows data synchronization. These features are integrated to improve the efficiency of block chain system in each stage of operations. It provides reliable and accurate information on digital certificates and compares user live face with verified documents face by saving on paper, prevent document forgery, cuts management costs.

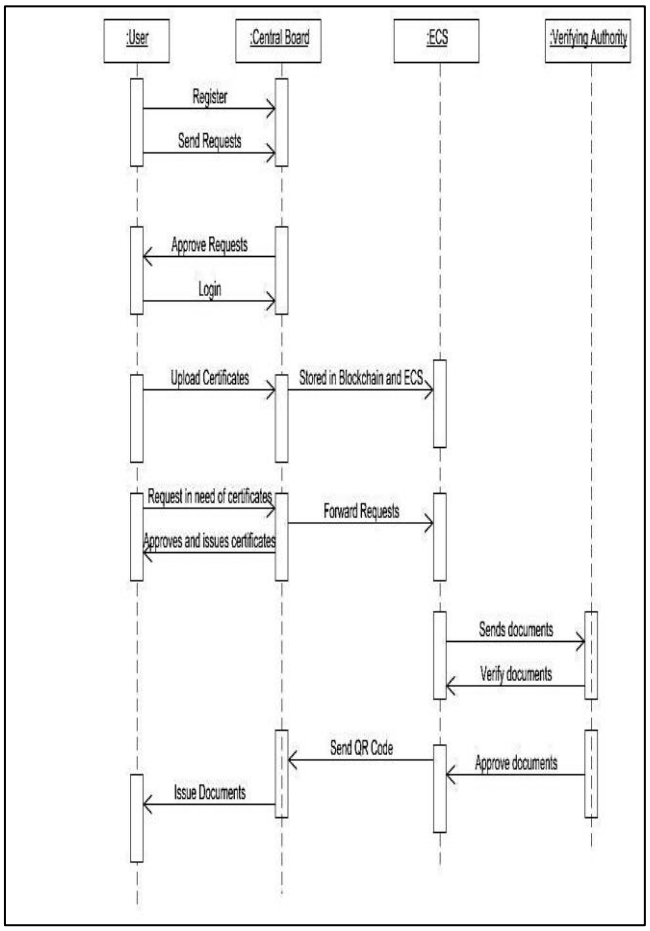


Fig.3

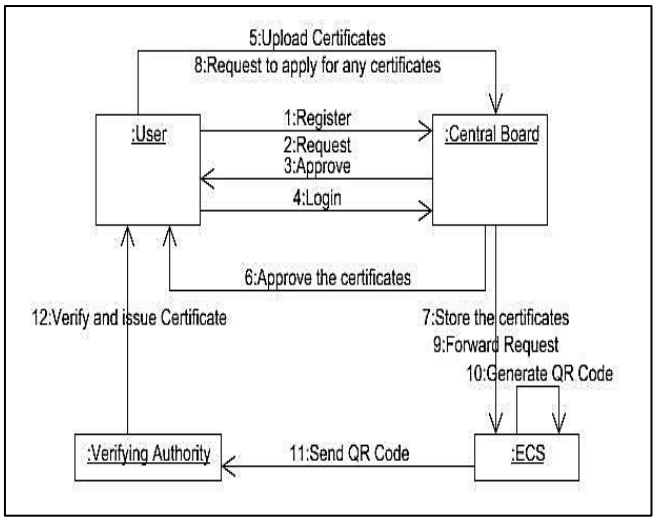


Fig.4

6. Modules

User Registration and Authentication

In this module user needs to registers into his application and a request will be sent to central board server for authentication. Unless the central board server approves the

request, user cannot login into his account. When central board server approves the request, a key will be generated and user can login into his account.

User Upload Certificate

After user login into his account he needs to upload certificates namely pan card, Aadhar card, voter id, SSC certificates to central board server. Central board server will review the certificates and accepts or decline the certificates. If central board server accepts the certificate those details will be stored in E.C.S and Block chain. If central board server declines the certificate it won't be stored in E.C.S. or Block Chain.

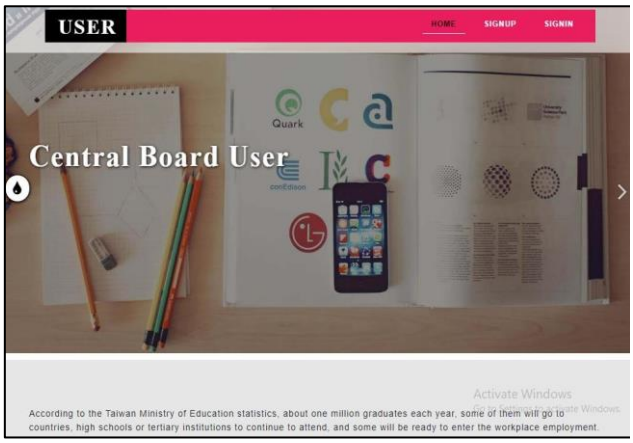
Get Certificate

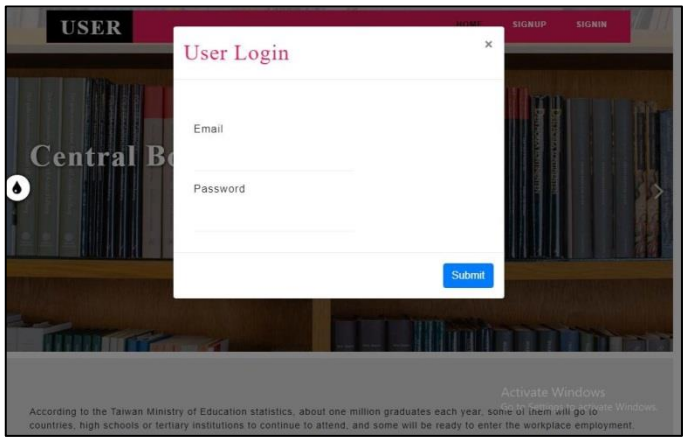
If user needs a certificate, he will send request to central board server. If central board server found the user details to be genuine, he accepts the request and forward a request to E.C.S where all the certificates will be there. E.C.S. responds for the request and certificates will be provided to the user.

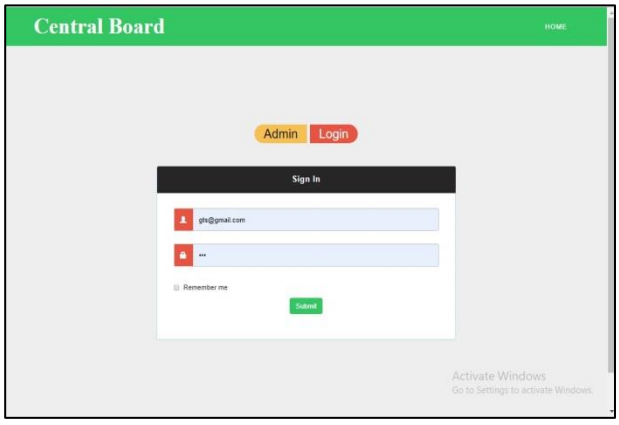
QR Request and Face verification

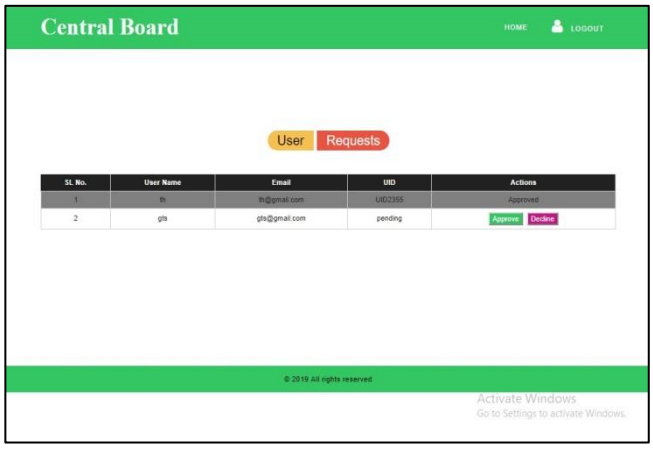
If user wants to apply for any certificates, he will send request to central board server and central board server will check the details and forward the request to E.C.S. E.C.S will generate the QR Code and forwarded to user via central board server. User forwards the QR code to the verifying authority and if all details are correct and face matches with live face Verifying authority will issue the document. E.C.S. responds for the request and certificates will be provided to the user. If user wants to apply for any certificates he will send request to central board server and central board server will check the details and forward the request to E.C.S. E.C.S will generate the QR Code and forwarded to user via central board server.

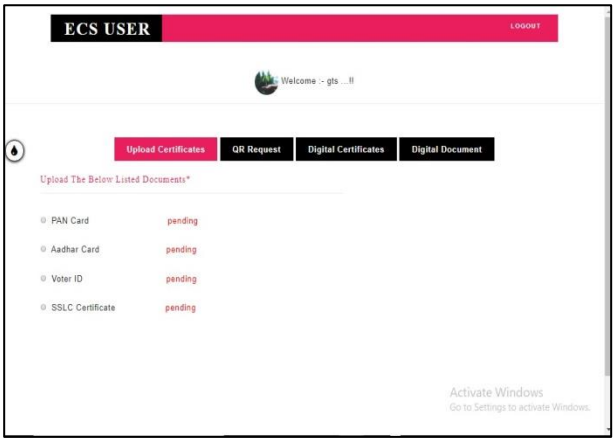
7. Output & Discussion











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