e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 6, Issue 5, May 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.54

International Journal Of Multidisciplinary Research In Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

Credit Card Transaction Based on Face Recognition Technology

M.Abirami, S.Dhivya, S.Kowsalya,R. Mahalakshmi, Mr.G.Sivakumar

Students, Department of CSE, Gnanamani College of Technology, Namakkal, India

AP, Department of CSE, Gnanamani College of Technology, Namakkal, India

ABSTRACT: In this world, money is crucial. Different payment methods are available at Points of Sale (POS), including cash on delivery, online transactions, credit card transactions, and monthly instalment plans. Customers have the choice of using credit/debit cards or internet banking whenever they transact online. Since the credit card offers prominent use as a payment method, it is frequently used. Online transactions present numerous opportunities for hackers or assailants to take sensitive data in real time. Both valid and invalid transactions are completed, and an acknowledgement is then issued to the bank. a system for credit card transactions that uses web applications for facial detection and identification technology. Attacks on several privacy issues, such as credit cards, are the main issue that credit card users deal with. Typically, individuals experience this when their credit card is given to an unexpected party or lost. Therefore, a mechanism that will lower the risk of theft of credit cards is being processed here. The suggested system processes the user's face image input and compares it to the user's dataset. A record of information will be kept for the purpose of authentication. The characteristics of the Grassmann learning algorithm are used in this suggested way to recognise faces during transaction processes. If the photos line up, it indicates that the user is real, and processing will be permitted; otherwise, the transaction will be declined.

KEYWORDS: E-Commerce Application, Credit Card Transaction, Face Recognition, User identification, Alert System.

I. INTRODUCTION

E-commerce is quickly becoming a recognised and utilised business paradigm. More and more companies are putting in place websites with capability for conducting business transactions online. It is fair to assume that doing your shopping online is getting more commonplace. As an illustration, one of the project's goals is to create a general-purpose e-commerce site where any goods (including books, CDs, laptops, cell phones, electronics, and home appliances) may be purchased online while relaxing at home. A simulated shop on the World Wide Web where clients can browse the inventory and choose items of interest is known as an online store. The chosen items could be put in a shopping basket. The goods in the shopping basket will be shown as an order when it is time to check out. At that point, more details will be required in order to finalize the purchase. The customer will typically be required to provide or choose an email address, a mailing address, a delivery option, and payment details like a credit card number. Credit and debit cards are the most popular methods of payment when conducting an online transaction. Customers can buy anything, wherever, without worrying about possessing enough money because they don't need to carry a lot of cash. In this project, face recognition technology is used for credit card transactions. Only continue with the subsequent phase once the face recognition process has been completed completely. Shortly as the purchase is placed, the customer receives an email notification. Customers who have purchased products from online retailers are frequently asked for or provided with reviews of such products. As e-commerce expands and gains popularity day by day, the volume of customer reviews of the product also increases quickly. The number of reviews for a well-liked product can reach thousands. This makes it challenging for a prospective customer to comprehend them and decide whether to purchase the product or not. Additionally, it becomes difficult for the product's maker to monitor and control user reviews. The producer also faces extra challenges because there are likely numerous additional merchant sites that are selling the same goods at a good price, and the manufacturer typically makes a variety of products.

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

Fig 1 shows the face recognition process

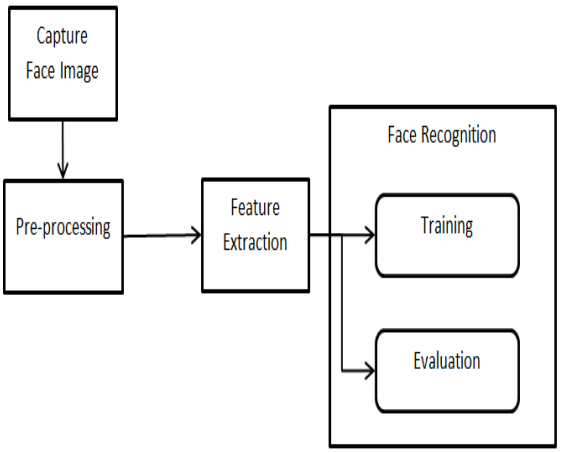

Fig 1: Face Recognition

II. RELATED WORK

Chen, et.al,…[1] Proposed Without the use of domain labels, domain dynamic adaptation meta-learning (D2AM) splits mixing domains iteratively using prejudiced domain representation and develops generalizable face anti-spoofing through meta-learning. We specifically offer a domain representational machine learning module (DRLM) for obtaining prejudiced territory features for clustering and build a domains characteristic based on instance normalization (IN). This work also uses minimum mean difference (MMD) to align the pattern of distribution of sample characteristics to a prior shipping, which enhances the reliability of clustering, in order to lessen the adverse impact of extremists on clustering performance. Numerous tests demonstrate that the suggested approach outperforms other DG-based face anti-spoofing techniques, including those that make use of domain labels. The suggested procedure has two steps. The pseudo area label is assigned by clustering using discriminative domain representation in the first stage (blue flow). In particular, user processes the features derived by the model using IN and converts them into domain features because the clustering characteristics extracted from the network's data before treatment contain more task discriminating information. Next, develop a face anti-spoofing models using meta-learning based on a fictitious domain label in the subsequent stage (red flow). Include an MMD-based regularization in the feature learning process as well. This encourages the model's ability to correct the pattern of distribution of observed samples and regularizes the feature space for improved clustering.

Sanjay. T, et.al,…[2] Implemented a Criminal face identification systems assist in locating information about suspects and in identifying criminals. We can use that time for manual labour instead. An unique Convolutional Neural Networks, is used to distinguish between facial photos associated with crime and those that are not. The face serves as the main visual cue for identification. Computer algorithms are used by facial recognition systems to identify a person's face. This illegal face detection aids in a quicker identification of the suspect. The system's main job is to verify or identify faces from a collection of facial photos. This is a neural network-based programmed that aids in our ability to look into and separate criminals from non-criminals. In comparison to other biometric identifying methods like fingerprints, face recognition offers significant advantages. This system assists with face identification as well as obtaining the suspect's prior offences, if any. In terms of picture categorization, CNN has lately surpassed other neural network architectures; the machine learning process aids in facial identification. This system for identifying criminals can be utilised in forensics to identify the victim as well as in criminal investigations to identify perpetrators. The CNN algorithm used for illegal face detection is more accurate than the HAAR Cascades method, according to an analysis of the data.

Wang, et.al,…[3] Presented a newly developed embedding-level and predictions level consistency regularization (EPCR) framework to guarantee the consistency of the features in the FAS model and to deliver signals for self-supervised learning. In this system, a dense resemblance loss is designed at the embedding level

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

to maximise all positions' similarity between two intermediate map features in a self-supervised manner, and at the prediction level, users are encouraged to minimise the average square error between two views' predictions. Notably, the proposed EPCR is annotation-free and easily adapts to semi-supervised learning models. Author further develops five unique semisupervised protocols to evaluate semi-supervised FAS approaches while taking into account various application scenarios.The core self-supervised architecture in the proposed EPCR for the face anti-spoofing approach allows two augmented versions of the same facial image to learn representations from one another. A density feature generation and dense similarity loss are used to accomplish embedding-level consistency regularization, which helps the model acquire more discriminative representation. The suggested EPCR makes more accurate prediction than the baseline, demonstrating its ability to encode discriminative features.

Islam, MdTowfiqul, et.al,…[4] Implemented a employing a machine learning system that can recognize a person's face and be processed further for use in various tasks. Convolutional neural networks (CNN), the Cascaded Convolutional Neural Networks, the Haar Cascade Classifier, the Deep Convolutional Neural Network (DCNN), and the MultiTask Cascaded Convolutional The networks (MTCNN) were presented in this research work and used to complete this work. The most precise model, and one that offers the best accuracy, is the MTCNN model.The dataset was produced using researchers' geographic data. There are four ways to examine a face: fully, fully without a face mask, on the right or left side. Data that is noisy as well as inconsistent may be cleaned up using preprocessing methods. A number of preprocessing techniques have raised the quality of the final product. Here also had to remove faulty data in order for the model to function correctly. The face dataset's pre-processed attributes are used to create a feature set for the classification model. Once this is done, several Classification algorithms are trained to be used in trials linked with this research.

M. Aishwarya Sri, et.al,…[5]Presented an overview of the existing algorithms used for facial recognition in this study. This review is based on previous and continuing inquiries conducted by other researchers on the same topic. The most general criteria for a distinct algorithms have been chosen. Principle Component Analysis (PCA), Adaptive boosting, Linear Discriminant Analysis (LDA), Local Binary pattern Histogram (LBPH), Convolutional Neural Network (CNN) and Artificial Neural Network (ANN) are the various algorithms used. For the review of the algorithms, several parameters were taken into consideration. Here introduces a revolutionary deep learning-based face recognition attendance system that takes advantage of recent breakthroughs in the creation of deep convolutional neural networks (CNN) for face detection and recognition applications. The entire process of developing a facial recognition model is covered in detail. The CNN cascade for face recognition and CNN for generating face embeddings are two key components of this model, both of which were built using today's most sophisticated techniques. The main goal of this research was to see if these cutting-edge deep learning methods might be applied to handle real-world facial recognition difficulties. Because CNNs produce the best results for larger datasets, which is not the case in commercial applications, the main issue was applying these approaches to smaller datasets. A new method for image augmentation for face recognition applications is proposed.

Casado**,** et.al,…[6] Presented a novel scheme that extract facial videos, just based on visual information, removing the need for any contact-based device. This proposed solution is based on a pipeline that is able to extract complete remote photoplethysmography signals (rPPG) in a fully unsupervised manner. Proposed work aims to analyze the impact of different levels of depression on the physiological response of the blood volume pulse (BVP) signal. In particular, user aim to extract heart-related features from the BVP signal using remote photoplethysmography (rPPG) from facial videos in a fully unsupervised manner, using a non-learning based method that relies mostly on signal processing. Based on this, here propose, for the first time, a novel approach for automatic depression screening using these physiological signals extracted from facial videos and machine learning. In general, divide the rPPG methods into two main categories: Unsupervised or non-learning-based methods and supervised or learning-based methods. The unsupervised rPPG methods focus on recovering the BVP signal by finding skin areas suitable to extract the raw RGB signals using face detection, tracking, and segmentation techniques. After that, these methods carefully process these raw RGB signals to separate the physiological signals contained in the subtle variations of the skin color from the rest of the information (motion, illumination changes, or facial expressions, among others) by applying filtering and different ways of combining the RGB signals into an rPPG signal.

Bhushan**,** et.al,…[7]Proposed a new framework, called FRS-DCT-SVM, that uses GA-RBF for face detection and optimization and the discrete cosine transform (DCT) to extract features. FRS-DCT-SVM using GA-RBF gives better results in terms of clustering time. The decision boundary is the critical issue in SVM algorithms, where a radial basis function is the one that changes with the distance from a location. An ORL and YALE face dataset was used that contains 400 images of forty different subjects. Validation was used in this experimental work, as 80% of the dataset was used for training and the remaining 20% was used for validation. In some of the subjects, factors such as time, lighting, and facial expressions (smile/nonsmile, open eyes/closed eyes), and details of faces, such as the subject

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

wearing glasses or not wearing glasses, will be different at different times. The issue will be in the frontal positioning in all images, and the background will be dark and homogeneous. The size of each image is 92 × 112 pixels, and each pixel has 256 grey levels. Each photo in the training and testing sets of pictures was apportioned into the equivalent size of squares. Subsequently, the DCT coefficient was determined for each square. The obtained coefficients were changed to include vectors. Then, the highlight vectors of the training set were prepared by the radial basis function-based SVM. In this, the radial basis function portion boundary of the SVM σ was streamlined by traditional tasks. Discrete Cosine Transform (DCT) is a strong transform used to extract features in facial recognition. After implementing DCT over all the images, feature vectors were constructed based on Zonal masking coefficients. Optimization was done through GA-RBF. When there was a requirement to compensate for illumination variations, the available low-frequency coefficients were discarded.

Dong, et.al,…[8] Proposes a video oriented cascaded intelligent face detection algorithm, which builds deep learning network by cascading multiple features, from edge features, contour features, local features to semantic features, and advances layer by layer. According to the last semantic features, the information of the input data is obtained to accurately realize the face detection under the non-ideal condition. According to the continuous distributed activation state of human brain neurons, this paper proposes a cascaded deep learning detection network for video single frame face detection. By reducing the number of neurons in each hidden layer by layer to restrict the size of neurons in the network and improve the calculation efficiency, and using skin color detection to generate candidate areas in the preprocessing layer, the robustness of the neural network is improved while reducing the number of neurons in each layer of the network. The detection network initializes the network parameters through pre training, and uses greedy learning to avoid multi-layer network training. Because of the multi-layer error transfer, the error obtained at the last layer is too small to adjust the network parameters well, which further improves the robustness while maintaining the global optimization of the learning network. Face recognition is the key of biometric recognition. The most popular research of artificial intelligence is face recognition technology. With the development of science and technology, the application of face recognition technology in intelligent video surveillance system has broad application prospects and great practical significance. In this paper, a face recognition algorithm based on multi model combination of deep learning is proposed.

Peng, Chunlei**,** et.al,…[9]Presented a soft face parsing algorithm where the boundaries of facial components are measured as probabilistic values. By taking the original face image as the guidance to improve face parsing result, each pixel may belong partially to the facial component to avoid inaccurate segmentation around component boundaries. Then propose a hierarchical soft semantic representation framework for crossdomain face recognition. Both the soft semantic level and contour level deep features obtained via CNN are computed and combined together, which could fully exploit the identical semantic clue among cross-domain faces. Firstly, a soft semantic face parsing algorithm is applied to the images in both domains, and generates a soft semantic parsing map for each face image. Secondly, design a hierarchical framework to extract deep CNN features from both the soft semantic level and contour level under the guidance of the soft face semantic map. It is a common strategy to utilize a step-to-step method for cross-domain face recognition problem. For example, in [55] the face images are firstly processed by a face completion method and then fed into a CNN for cross-domain face matching. This approach firstly learns a discriminative face representation to obtain a new image pattern, and then the filtered images are projected into one common subspace for recognition. Similarly, here present a two-phase framework to solve cross-domain face recognition.

Perveen**,** et.al,…[10]Implemented a dynamic kernel-based representation for facial expressions that assimilates facial movements captured using local spatio-temporal representations in a large universal Gaussian mixture model (uGMM). These dynamic kernels are used to preserve local similarities while handling global context changes for the same expression by utilizing the statistics of uGMM. In this work demonstrate the efficacy of dynamic kernel representation using three different dynamic kernels, namely, explicit mapping based, probability-based, and matching-based, on three standard facial expression datasets, namely, MMI, AFEW, and BP4D. A universal GMM (uGMM) model with simple kernel computations is used to capture the local dynamics while preserving variations in global context. This work have shown that by subsuming first and second order statistics of uGMM, a kernel based representation can be derived for recognizing the facial expressions efficiently. Evaluate the proposed approach on three challenging benchmark datasets to show the generic mechanism of the proposed approach for videobased facial expression recognition.

III. TRADITIONAL CREDIT CARD TRANSACTION METHODS

In credit card transaction method, the cardholder physically presents his card to the merchant for payment. An attacker must steal the credit or debit card in order to carry any fraudulent activity in this type of purchase. If the

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

cardholder does not notice the theft of the card, the credit card firm may suffer a significant financial loss. Only a few key details about credit card information (card number, expiration date, and security code) are necessary to complete the transaction. Typically, such purchases are made over the phone or on the Internet. A scammer only has to have the card details to conduct fraud in such types of transactions. Almost all of the times, the actual cardholder is unaware that his or her card information has been seen or stolen by someone else. But one way to identify this fraudulent activity is to examine each card's spending history and look for any anomalies from "normal" purchasing patterns. Detection of fraud based on an examination of a cardholder's existing purchase data is a promising method of reducing the percentage of successful fraudulent activity. Different Algorithms and techniques have been designed to implement the facial recognition as a key element for authentication of card holder. These cards were not normal office cards or any other card than the credit card. Many institutions use e-ID cards as access control authorization, it means that one just needs to possess card in order to get access to resources e.g. room or elevator. In such a scenario it is sufficient to steal or duplicate a card of legitimate user in order to get all its credentials. It is also possible to borrow such an e-ID card from third parties in an unlimited way. Based on these arguments existing framework propose a new solution preventing from using electronic cards by unauthorized persons as well as limiting the usage of stolen cards.Simultaneously the whole system should be as transparent as possible for users and not force them to change their habits in major way.

IV. PROPOSED METHODOLOGY

The proposed system is developed after a detailed study about the requirements requested by the user. Proposed system is a computerized one, where all the limitations of manual system are compensated. Product details of online shopping system with credit card transaction based on face recognition technology have simplified the working information and make a user friendly environment, where the user is provided with much flexibility to manage effectively. It helps the retailer to generate desirable reports more quickly and also to produce better results. In the proposed system, using face recognition based web application to provide secure transaction authenticity of credit card holder for online shopping. For recognition of face images, here implement Grassmann Learning approach. Grassmann learning is a dimensionality reduction algorithm where subspaces are mapped as points onto a smooth and curved surface where distances between subspaces are geodesic. The main advantage of Grassmann learning over traditional manifold learning methods is that high dimensional feature representations may not typically lie on a Euclidean space. Grassmann learning maps subspaces onto points based on orthogonal constraints, promoting high betweenclass discrimination by their geometrical structuring, and accounting for missing data through subspace spanning. Grassmann kernelization embeds subspaces onto a projection space where distance computations can be effectively performed. A Grassmann manifold is a space that promotes smooth surfaces, where points represent subspaces and the relationship between points is defined by a mapping of an orthogonal matrix. Grassmann learning involves embedding high dimensional subspaces and kernelizing the embedding onto a projection space where distance computations can be effectively performed. In this project the user can buy a product through this website, after buying the products the user can pay the amount using credit card transaction with face detection. So face detection verifies user face by capturing it using camera, after successful face detection method the user can pay the purchased amount.

The proposed framework is shown in fig 3.

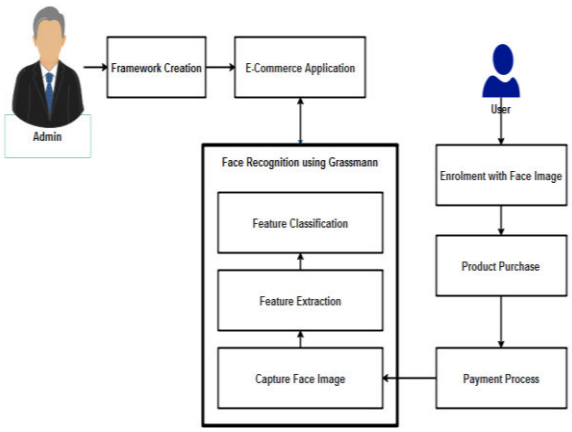

Fig 2: Transaction using Face Recognition

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

FRAMEWORK CREATION

Framework creation is the process of developing E-commerce application with proposed facilities. In this application admin can add the product details like product id, name, type, amount, quantity and so on. Then user can create their account by providing required information to the system. The registration form details are like user name, email, gender, mobile number, address, and credit card details etc. Here user's face image captured through web cameras and registered in database for further verification. These details are stored in the database. And then can getting to the username and password in the system.

PURCHASE PRODUCT

In this module, user can login in E-Commerce application and search product for purchasing. The user can view the product details like product name, type, amount, description etc. After viewing all products, the user can select product based on their need. The user's purchase details are sent to the admin.

FACE IMAGE ACQUISITION

In proposed E-Commerce application user can make payment securely with the help of face recognition approach. This module contains user's card details like name, card no, amount etc. After successfully entered the card details the system, user's face image was captured with the help of web camera. Then the captured face image compared with particular card holder account database. If the user face image is matched with database, the user payment is transferred. Otherwise the user payment is not transferred.

FACE CLASSIFICATION

Face classification is the process of extraction facial features and compared with database for user verification. Facial highlights such as nose part, eye parts and lip part are extracted as feature values. These qualities are put away is as grid. The framework can be shaped by utilizing Grassmann manifold learning computation. The feature data of particular facial image helps its application as a biometric identifier for individual acknowledgment. Face acknowledgment frameworks set up the nearness of an approved individual instead of simply checking whether a legitimate (ID) or key is being utilized or whether the client knows the secret individual ID numbers (Pins) or passwords. At the point when the main two coordinated countenances are exceptionally like the verification of face image.

PAYMENT PROCESS

Once the face detection process is completely finish then user can move on to the payment process. Here user can enter the amount should be transferred. Then the amount transaction was completed in highly secure manner. When the classification process got failures to detect the face image or identify the fake user the system will automatically send e-mail notification to the customer as soon as the order is placed.

GRASSMANN ALGORITHM:

Representing the facts on Grassmann manifolds is famous in some image and video recognition responsibilities. In unique, here design complete rank mapping layers to convert input Grassmannian records into extra desirable ones, make the most orthogonal re-normalization layers to normalize the ensuing matrices, observe projection pooling layers to reduce the version complexity in the Grassmannian context, and devise projection mapping layers to show the ensuing Grassmannian information into Euclidean forms for ordinary output layers. To train the deep community, this make the most a stochastic gradient descent placing on manifolds in which the connection weights are living on, and have a look at a matrix generalization of returned propagation to replace the established statistics. The famous packages of Grassmannian records inspire us to construct deep neural network architecture for Grassmannian representation studying. For this motive, the new community architecture is designed to take Grassmannian statistics at once as enter, and learns new favorable Grassmannian records which might be able to improve the final visual responsibilities. In other phrases, the new community pursuits to deeply examine Grassmannian facts on their underlying Riemannian manifolds in an stop-to-give up getting to know structure. To perform discriminant gaining knowledge of on Grassmann manifolds, many works embed the Grassmannian into a Euclidean space. This may be finished both by way of tangent space approximation of the underlying manifold, or with the aid of exploiting a high-quality particular kernel function to embed the manifold into a reproducing kernel Hilbert space. In each of such cases, any present Euclidean method can then be carried out to the embedded information, considering that Hilbert spaces respect Euclidean geometry. For example, first embeds the Grassmannian into a high dimensional Hilbert area, and then applies conventional Fisher analysis approach. Obviously, most of those techniques are restricted to the Mercer

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

kernels and consequently constrained to apply best kernel primarily based classifiers. Moreover, their computational complexity increases steeply with the range of education samples.

The Grassmann manifold G(m, D) is the set of m-dimensional linear subspaces of the R and D. The G(m, D) is a m(D−m)-dimensional compact Riemannian manifold.

An element of G(m, D) can be represented by an ortho normal matrix Y of size D by m such that Y = Im, where Im is the m by m identity matrix. For example, Y can be the m basis vectors of a set of pictures in R D.

However, the matrix representation of a point in G(m, D) is not unique: two matrices Y1 and Y2 are considered the same if and only if span(Y1) = span(Y2), where span(Y) represents the subspace spanned by the column vectors of Y . Equivalently, span(Y1) = span(Y2) if and only if Y1R1 = Y2R2 for some R1, R2 ∈ O(m). With this understanding, here will often use the notation Y when user actually mean its equivalence class span(Y), and use Y1 = Y2 when user mean span(Y1) = span(Y2), for simplicity.

Practically, the Riemannian distance is measured between two subspaces is the length of the shortest geodesic connecting the two points on the Grassmann manifold. However, there is a more intuitive and computationally efficient way of defining the distances using the principal angles.

V. EXPERIMENTAL RESULTS

A biometric evaluation system that assigns all authentication attempts a 'score' between closed interval [0, 1]. 0 means no match at all and 1 means a full match. If the threshold is set to 0, then all the users including the genuine (positive) and the impostors (negative) are authenticated. If threshold is set to 1 then there is a high risk that no one may be authenticated. Therefore, in realtime systems the threshold is kept somewhere between 0 and 1.

So, this threshold setting can sometimes may not authenticate the genuine users, which is called FRR (False Reject Rate).

The term FRR (False Rejection Rate) represents the case when the original gets rejected, by increasing the threshold the original chance to get rejected increasing.At the threshold of 0 the original will pass 100% and this decreasing by increasing the threshold.

FRR is calculated as a fraction of positive scores falling below user threshold.

FRR = Genuines scores exceeding threshold/all genuine scores

Genuines scores exceeding threshold = FN

All genuine scores = TP+FN

FRR = FNR = FN/(TP+FN)

Below table represents the FRR Value for Different Classification Algorithms.

Algorithms	FRR Value
PCA	0.63
LDA	0.48
SVM	0.32
Grassmann	0.18

Table 1: Performance comparison using FRR Value

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.54|

| Volume 6, Issue 5, May 2023 |

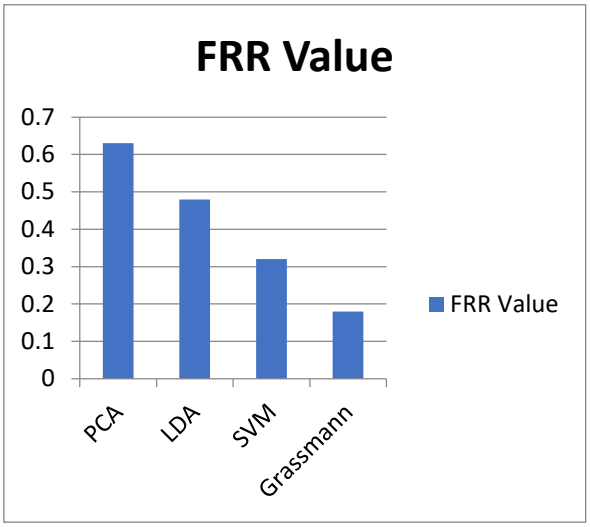

Fig 3: Performance Chart using FRR Value

VI. CONCLUSION

This project entitled as "Credit Card Transaction Based on Face Recognition Technology" has been developed to satisfy all the proposed requirements. The process of recording details about online shopping is more simple and easy. The system reduces the possibility of errors to a great extent and maintains the data in an efficient manner. User friendliness is the unique feature of this system. The system generates the reports as and when required. The system is highly interactive and flexible for further enhancement. The coding is done in a simplified and easy to understandable manner so that other team trying to enhance the project can do so without facing much difficulty. The documentation will also assist in the process as it has also been carried out in a simplified and concise way.

REFERENCES

1. Chen, Zhihong, Taiping Yao, Kekai Sheng, Shouhong Ding, Ying Tai, Jilin Li, Feiyue Huang, and Xinyu Jin. "Generalizable representation learning for mixture domain face anti-spoofing." In Proceedings of the AAAI Conference on Artificial Intelligence, vol. 35, no. 2, pp. 1132-1139. 2021.
2. Sanjay, T., and W. Deva Priya. "Criminal Identification System to Improve Accuracy of Face Recognition using Innovative CNN in Comparison with HAAR Cascade." Journal of Pharmaceutical Negative Results (2022): 218-223.
3. Wang, Zezheng, Zitong Yu, Xun Wang, Yunxiao Qin, Jiahong Li, Chenxu Zhao, Xin Liu, and Zhen Lei. "Consistency Regularization for Deep Face Anti-Spoofing." IEEE Transactions on Information Forensics and Security (2023).
4. Islam, MdTowfiqul, Tanzim Ahmed, ABM Raihanur Rashid, Taminul Islam, MdSadekurRahman, and MdTarekHabib. "Convolutional Neural Network Based Partial Face Detection." In 2022 IEEE 7th International conference for Convergence in Technology (I2CT), pp. 1-6.IEEE, 2022.
5. M. Aishwarya Sri, Dr. V. GeethaPriya, "A Comparative Study of Face Detection and Recognition Techniques" volume 11, Issue 06 (June 2022).
6. Casado, ConstantinoÁlvarez, Manuel LageCañellas, and Miguel BordalloLópez. "Depression Recognition using Remote Photoplethysmography from Facial Videos." IEEE Transactions on Affective Computing (2023).
7. Bhushan, Shashi, Mohammed Alshehri, NehaAgarwal, Ismail Keshta, JitendraRajpurohit, and AhedAbugabah. "A novel approach to face pattern analysis." Electronics 11, no. 3 (2022): 444.
8. Dong, Zuolin, Jiahong Wei, Xiaoyu Chen, and PengfeiZheng. "Face detection in security monitoring based on artificial intelligence video retrieval technology." IEEE Access 8 (2020): 63421-63433.
9. Peng, Chunlei, Nannan Wang, Jie Li, and XinboGao. "Soft semantic representation for cross-domain face recognition." IEEE Transactions on Information Forensics and Security 16 (2020): 346-360.
10. Perveen, Nazil, Debaditya Roy, and Krishna Mohan Chalavadi. "Facial expression recognition in videos using dynamic kernels." IEEE Transactions on Image Processing 29 (2020): 8316-8325.

Impact Factor
7.54

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com