

**To check the attentivity of student in Online Distance Learning (ODL)**

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### **Abstract**

Online Distance Learning (ODL) is an effective mode of wireless communications with students. It enables educators to use the simulation recordings or other subject matter. When participants have officially received, anywhere and at any time, digital media frameworks and technologies are useful and effective, but they can have drawbacks. However, one of the of the major complexity and obstacle is to examine and determine the students' attentivity in online class. The aim of this paper is to provide a system for measuring students' behavior, interest and attentivity level in virtual classroom that is mainly observed with the help of machine learning approaches. To accomplish automatic classification and detection accuracy on students' eye states, the system uses a Gabor wavelet which collect eye state attributes and characteristic features and exercises the model with the help of support vector machines (SVM). Research experimental studies on large numbers of facial images reveal that the presented framework achieves a high level of accuracy, which is useful in real-world implementations.

## **Introduction**

Distance learning is a mechanism of teaching and acquiring knowledge electronically in a digital classroom using a Personal Computer System (PC) or Smart devices when connected to the internet. However, virtual learning may facilitate learning in a number of different ways, it has grown rapidly in recent years. Learners will train at their own pace and at any moment in an educational technology world. Furthermore, the advancement of documentation and communication technology seems to have potential for students. Virtualization and digitalization also offer mechanisms and frameworks for observing and evaluating students' academic achievement, as well as forecasting market dynamics and developments. Such a sort of investigation will assist instructors in developing the new and efficient instructional approach as well as improving the presentation of educational materials. The use of digital instructional tools is now possible which is irrespective of time or location attributable features for the developments in mobile device technologies and intelligent measurement systems.

Principal component analysis seems to be an effective technique for analyzing and evaluating data as well as generating computational and theoretical techniques. To obtain the necessary and major characteristics of the statistical dataset as well as respective parameters, the approaches primarily introduce and comprises the dataset transformation of the covariance matrix. Principal component analysis is a well-organized tool for reducing data dimensions and it's incredibly beneficial while working with difficult and complicated data like facial expression recognition. Gabor plays an important role when obtaining specific area range and wavelet transformation from the target. As the Gabor wavelet should not be an orthogonal structure, it should develop a complete framework when certain conditions have been met. The Gabor feature extraction is efficient for the detection of image edges. Across a slightly elevated or effectively

unlimited space, a Support Vector Machine focuses on building a hyperplane or sequence of hyperplanes which could be utilized for segmentation, structural equation modeling, or other activities like feature extraction. The Naive Bayes Classification algorithms are computationally efficient and they usually involve parameter configurations. The highest possible statistical likelihood assessment and computational approaches are used by NBC for parameter estimation. KNN is a very convenient and adequate tool for the measurement of weight between nearest neighbors. Therefore, the weight of the nearest neighbors is significantly higher than the weights of the farthest neighbors.

In this documentation, machine learning approaches are used for the calculation of evaluation results for assessing participant consideration and attention in an online class. In this research work, we primarily concentrate on the characterization and identification of participants' eye states and introduce an automated evaluation framework concentrating on machine learning algorithm. The support vector machines technique is mainly used as the classification algorithm, and Gabor is used to retrieve the eye states characteristics in detail. Such framework minimizes time period and have more accurate identification, effective estimation and precise analysis than manual controlling.

## **Literature Review**

In Pakistan, online education faces some challenges that must be overcome in order for virtual education to be appealing and successful. Digital learners are said to experience physical issues such as blurred vision, headaches, light-headedness, and drowsiness [1]. Similarly, the study stated that virtual learners in the Pakistani context faced challenges related to infrastructure, such as power outages and a lack of backup power. The students identified their study difficulties, as well as their nervousness and depression as a result of them. Since online education necessitates active involvement from students, activity-based content is structured. Visionary and professional educationalists, as well as successful educational consultants, are expected to conduct business and establish specialized progressions. In general, higher education institutions give the impression that they place a strong focus on teaching and instructional standards that are tailored to the psychology of their students. In planning, designing, creating, and providing instructional and course materials to its students, the Virtual University of Pakistan employs an andragogical approach.

The thesis looked at how university lecturers may be encouraged to have quality service. The research looked at the lecturers' motivation as well as their job results. It was suggested that the government pay more attention to the teaching-learning environment, which can have an effect on the efficiency of the university's outputs [2]. It was again proposed that the university administration implement the different solutions suggested in this paper in order to ensure improved service quality by university lecturers. The appropriate data for the thesis was collected using two self-designed instruments. Frequency counts, percentage scores, and bar charts were used to interpret the results. According to the findings, lecturers' morale and job results were

relatively high. The research also revealed a number of methods that, if properly applied, would improve university lecturers' service delivery.

Virtual education has begun in a variety of educational establishments. Education is a crucial socialization organization. Because of Covid-19, traditional schooling is no longer possible. According to the case, digital education is taking over. In Lahore, Pakistan, an online survey was conducted to determine the degree of approval of online education. The distribution of the respondents was examined using the program "Statistical tools and kit of social sciences." According to a comparative report, the majority of respondents support online schooling in the given circumstances. It is recommended that the government raise concern about online education in order to make it more competitive because it is a pressing need [3]. Many researches back up the assertion that education plays a significant role in people's growth. Children's interest in schooling is also influenced by parental class and education. Those children who are living at home and studying by distance schooling services during the Covid-19 pandemic get greater support from their parents because parents are constantly monitoring their children's activities. Trained parents are more supportive than uneducated parents in this case. Online schooling has both advantages and disadvantages. Distance education is superior to formal education because students are unable to communicate individually with their professors like they did in the past, and they are therefore unable to reach their peers as they did in the past.

High-quality education is entirely the responsibility of the government and educational establishments. The mission of HEC is to ensure educational excellence by adhering to defined guidelines. This tragic situation necessitates the intervention of all stakeholders who are wise and willing. People in developed nations, the World Health Organization (WHO), and Pakistan's

Prime Minister has all urged people to learn to cope with Coronavirus for a while before a long-term solution is found [4]. In view of the current crisis, the government, HEC, and universities must take a proactive, realistic, and positive stance in order to preserve millions of students' time and the primary goal of education. Administrators at HEC and HEIs are enacting policies that will intensify the chaos among students, rather than soliciting ideas from scholars for a sensible way forward in this crisis.

The Pakistani government uses technologies to assist the over 50 million schoolchildren who do not have access to broadband internet or digital devices, such as a state-owned TV channel that streams content for grades 1-12 and software sourced for free from ed-tech firms [5]. There are over 54 million viewers to the TV station, and there is a text-messaging service that enables its 250,000 subscribers to communicate with experienced teachers. Despite the digital divide, after the Covid-19 pandemic, the use of educational apps has increased dramatically. Technology, on the other hand, is not a panacea for the country's wide educational disparities. As Pakistan recovers from the worst day of the latest coronavirus pandemic, schooling has a real chance to turn a new leaf and move into a brighter future. This will necessitate looking beyond the box and implementing creative, constructive, and optimistic solutions around the board.

The COVID-19 has caused schools all over the world to close. About 1.2 billion children are out of school worldwide. As a result, education has undergone significant transformations, with the advent of e-learning, in which teaching is done remotely and through interactive platforms. With the abrupt turn away from the classroom in many parts of the world, some are asking whether online learning adoption would continue post-pandemic [6], and how such a shift will affect the global education industry. And before COVID-19, education technology was



seeing rapid growth and penetration, with global EdTech investments exceeding \$18.66 billion in 2019 and the potential demand for online education expected to exceed \$350 billion by 2025. Since COVID-19, there has been a substantial increase in use of language applications, interactive tutoring, video conferencing tools, and online learning technologies. The use of computer technology in education will intensify, and online education will finally become a standard part of schooling.

This pandemic has the potential to drastically alter education. The business has a long tradition of conservatism and resistance to reform. It had slate for decades, then a century of blackboard and chalk. Students also have access to Google's enormous expertise, which is much greater than that of any particular instructor [7]. One of the most impacted areas is education. It forced the world's education system to close for more than half a year. Though advanced countries have switched from traditional to online education. Third-world countries, such as Pakistan, were the hardest hit because they lacked the required infrastructure for online education at some point during the COVID-19 pandemic. The transfer of this new technology from students to teachers has been fraught with difficulties. During the COVID-19 era, this study identified barriers to online education in Pakistan and provided systemic strategies for dealing with and resolving these changes in the future, in the event of a new crisis. There is no doubt that there will be many benefits, including cost-effectiveness, until online education becomes the norm.

We hypothesized that students judge online materials based on what they find fascinating and what they consider to be a "value-add investment" in return for their time, based on the literature and our considerable experience in the field. In both domestic and foreign education sectors, online learning platforms and education models are undeniably essential [8]. If the shift

from physical classrooms to online environments is transient or permanent in the post-COVID19 era, the trend toward digital-based educational interactions is expected to continue. Students' expectations of quality would undoubtedly influence enrolment numbers within these online experiences. It is fair to expect students to have an elevated cognitive load when trying to handle the various styles/logics of knowledge presentation since they are likely to be studying several units at the same time and lecturers are reasonably free to follow their own arrangement within their units.

Their stable economies, technological advancements, and educational objectives have reduced the risk of failure. Because of the pace and scope of the educational chaos, millions of teachers and students have been forced to turn to online learning, a technique that is largely unfamiliar and untested in Pakistan [9]. They are experimenting with a variety of e-learning platforms, including Zoom, Google Classroom, Hangout, and Edmodo. The technology turns a smartphone device into a classroom where students and teachers can see and challenge each other in a truly immersive multimedia learning atmosphere. In today's world of teaching and learning, the idea of "paying attention" in education is almost obsolete. We missed out on valuable information in the previous days because we didn't pay attention.

Virtual students plan lectures, homework, and participation in organized learning events such as moderated message boards, quizzes, and tests around their own schedules. In the future, the Instructional Management System (IMS) will serve as the Motherboard, integrating all educational elements [10]. It will be run by the Course Teacher, who will be in charge of each student's course execution. Learning Management Systems (LMS) are software programs that regulate student collaboration and interaction.

According to the case, digital education is taking over. Online survey was conducted to determine the degree of approval of online education. The questionnaire was completed by 240 students who were taking online courses. The distribution of the respondents was examined using the program "Statistical kit of social sciences" [11]. According to a comparative report, the majority of respondents support online schooling in the given circumstances. It is recommended that the government raise concern about online education in order to make it more competitive because it is a pressing need. Traditional education is inferior to distance education. A variety of software is available for this purpose. Online teaching is a cutting-edge method of instruction. Online schooling has some advantages as well as disadvantages. Students are unable to communicate directly with their teachers, as they did in the conventional school system, and they are therefore unable to reach their peers, as they did in the traditional educational system. Face-to-face contact between the instructor and the students is referred to as traditional. Teachers delivered material orally or in writing and actively engaged students when doing so. Both the teacher and the students are physically present of the classrooms in this form of education [12]. The research led by Davies and Graff looked at the relationship between students who use eLearning and their academic performance. Interaction with online education improves user centered learning, encourages student engagement, and provides and supports increased depth, rational, and collaborative conversation forums in place of obsolete face-to-face discussion Programs, according to research on online education and academic learning.

Online learning deftly challenges the conventional teaching approach, in which a teacher asks students if they understand the subject, and the brightest nod their heads, before continuing with the lesson. There are several students in nearly every class who are hesitant to ask questions

because all five fingers are not the same. This platform cleverly tackles this critical problem by embedding video in the form of a filmed lecture, allowing students to view it several times.

Specific learning styles must be included in the instructional configuration of online educations, according to [13]. Where a student's learning is compatible with his or her learning patterns, it is more successful.

The participation of students in academic experiences can be used to assess effectiveness. The effectiveness of learning strategies is a metric that relates to the degree to which a learning process is successful. The success of the learning curriculum must be evaluated not only in terms of learning achievement, but also in terms of processes and supportive services [14]. The efficacy of online learning is supposed to be comparable to that of face-to-face instruction. From the viewpoint of MAUT students, this article will examine the feasibility of distance learning using social media during Pandemic Covid-19. Due to the pandemic of covid-19, the campus learning environment has been pushed to move from face-to-face sessions to online distance learning. Many universities that do not yet have an online learning system are unable to hold online seminars due to current constraints. During the Covid-19 Pandemic, this analysis would examine the feasibility of distance learning using social media.

In a web-based distance learning system, this research investigates the impact of instructional design and management style on student achievement and satisfaction. Structure and Interpersonal engagement were identified as two major instructional Design and management types in web-based distance education based on the literature review. Two web-based instructional programs were designed as college level courses to explore the discrepancies in learning performance variables. A single course was created and put into action. The key course was developed and delivered primarily through resource-based, highly organized self-learning

with no interpersonal contact, while the other course was developed and delivered primarily through interpersonal interaction without being well-structured [15]. In distance education, a teacher and a student are apart physically. People began to view distance education as a simulation of a dialogue between instructor and student, which helped to reduce the distance between teacher and student. The contents can be shown in the form of a written dialogue, according to distance educators. Teachers must pretend to be listening to others while writing instructional materials, as this is meant to encourage them to write in a natural spoken language wherever possible. To make up for the gap, many distance educators stress the importance of structure in creating text resources in distance education. According to Kearsley & Lynch, good distance education courses require a high level of structure, and William claims that the more ID elements integrated into a Distance education course, the higher the student achievement result. Structure and engagement, not learners' attributes such as technical competence or course execution style, are said to be the most important factors in distance learning.

Specialists in the educational sector are focusing their efforts on the learning experience in 21st century schools by equipping them with the right tools to construct an enticing and immersive learning environment. The aim of this research was to learn about university students' attitudes toward online course technology and how they can support the learning experience. Technology and distance education have had both positive and negative interactions [16]. Many classes that use technology in distance education are inefficient because teachers lack the technological skills to use it properly. As a consequence, innovation in distance education has been capable of overcoming interpersonal differences among students and assist them in achieving the program's information material. However, there are some issues that users face

while using technology in distance education, such as the high cost, issues with internet access and accessibility, and learners' lack of familiarity with the technology.

Lockdown has wreaked havoc in the education environment, but it has also caused substantial disruptions in schooling, including major disruptions in internal evaluations and qualification. Exams with developed countries like Pakistan, exacerbated by a tainted educational system, as demonstrated by a preference for even questionable international degrees, influence all similarly [17]. COVID-19, on the other hand, is bolstering the case for online scholars and emerging new technologies. Pakistan is on the verge of developing a dependable, cost-effective, and stable online academic system. The move from traditional teaching to online curriculum and course implementation is ongoing. Institutions have stopped in-person training in favor of immersive environments to facilitate literacy, recognizing that traditional schooling is a professional growth platform capable of increasing knowledge and social consciousness. Any focus group participants were worried that online learning's potential to recruit a significant number of students would become the greatest obstacle for teachers. Online learning is being blended with face-to-face courses at certain colleges. In this new age, teaching is changing at a rapid pace. It performs admirably. If their university offers [18], students have the opportunity to participate. As a result, edX and Coursera have a strong emphasis on recordings, while Future Learn and open learning have a stronger focus on participant engagement. There are several students in nearly every class who are hesitant to ask questions because all five fingers are not the same.

First, despite the current momentum, there are still no Internet-based alternatives to schools that are considered to be lasting. In the best-case scenario, the technology market will provide a competitive Supplementary learning environment [19]. Second, it must be understood

that not only the school, but also the irreplaceable cultural experiences that foreign travel provides, inspire one to travel abroad. Eventually, certain concerns remain unanswered, such as the ambiguity surrounding accreditation and Quality control. Finally, in smaller educational institutions, a shortage of sufficient IT facilities may be a deterrent. Fifth, a significant shift to online learning is expected to widen the literacy gap for low-income households, districts, and countries. Online education is a privileged activity that can only be effective in developed countries. Similarly, lack of schooling at home, absence of child and parental presence, family insecurity, domestic stress, and the absence of fathers due to distance employment will result in irreversible learning loss for these infants.

Training that takes place in a synchronous or asynchronous system is referred to as online learning. Students communicate with professors and fellow students through the internet from everywhere. Many claims in favor of online learning are based on this definition. Open, inexpensive, and scalable are just a few of them [20]. Learners can participate in online classes from any place. Interaction with the teacher and colleagues is a major factor in online learning satisfaction. During online lectures, this issue arose as yet another big issue (29.1 percent). Furthermore, the learning process is hampered by a lack of contact between students and teachers. Several students reported that they learn more effectively in groups than they do in online sessions. During online workshops, students reported a variety of disruptions (12.7 percent). These distractions were linked to peer intervention in online classes and domestic disturbances. The lockdown is now in effect. Both family members were forced to sit at home and participate in various sports. Many students are unable to find a separate place to meet with the professors and their peers due to a lack of space at home. This also prohibits them from taking part in online debates.

## **Methodology**

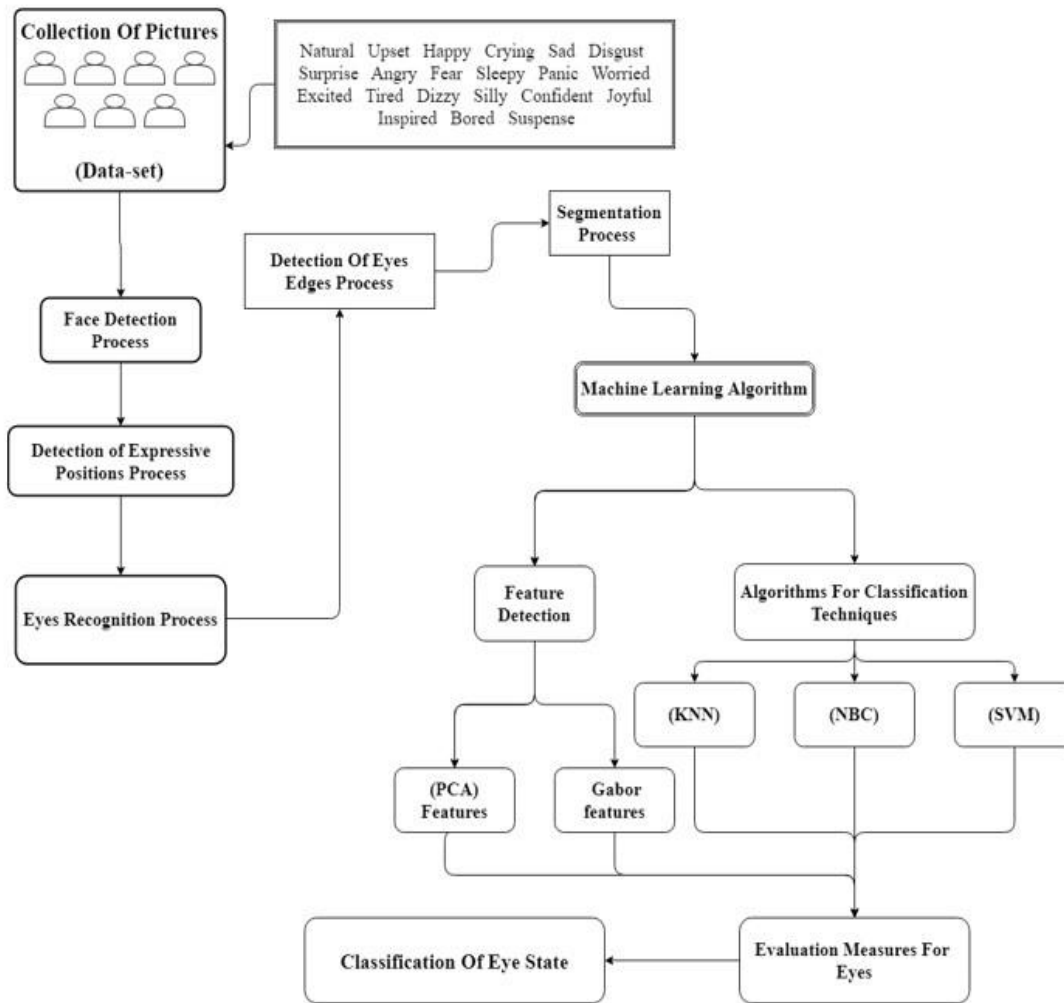
Online education is an approach of teaching and learning in virtual classroom using a computer or a cell phone connected to the internet. Since digital learning can facilitate learning in a number of ways, it has grown rapidly in recent years. Students will learn at their own speed and at any time. Furthermore, the advancement of information material and communication technology along with computer-generated technologies has the potential to support students. Digital media and communications technology also offer an opportunity and conditions for tracking and investigating students' learning behavior, as well as foreseeing movements and outlines. At the moment, most evaluations of virtual learning's effectiveness are focused on active input from students or instructors. Some research, on the other hand, claim that a considerable number of data can be well organized in order to establish terminology. As a result, this paper provides a more comprehensive evaluation approach for students' visual focus. In this research paper, a machine learning-based evaluation system for analyzing and investigating attention of the students in an online class. In this paper, we mainly concentrate on the classification of students' eye states attributes and suggest an automated assessment model based on machine learning approaches.

Experiments demonstrate that this model performs well in terms of reliability and accuracy, which is essential in real-world applications. Furthermore, the structure, which includes the use of existing machine learning models to detect faces and feature points automatically.

- For the evaluation of students' visual attention, we suggest a machine learning system, using automated face recognition, the framework was able to assess the attentiveness of the participant, particularly important are facial points attributes and eye states.
- For review and monitor classification, a machine learning-based scheme is introduced. The structure is based on support vector machines and Gabor. It significantly achieves the reliability of 95.76 percent using machine learning algorithm.



## Architectural Diagram



### ➤ **Evaluation of Visual Attentivity in Online Classes:**

We developed a methodology for automatically assessing a student's visual attention. This system will be designed by collecting images from the student's webcam's livestream. Every picture is automatically assessed by looking for emotional points and eye positions in the faces. The positions of the eyes are automatically identified to determine whether they are open or closed. Machine learning algorithms and predictor variables are used to make this automatic detection and efficient implementation. The architectural diagram describes the proposed framework's schematic diagram, which contains the steps below:

#### **1) Face Detection Process:**

In starting, we must evaluate regardless of whether or not an image or video sequence contains a face. For each frame, following calculation is used to measure the evaluation for the detection of face:

##### ○ **If no face detect:**

$$\text{Evaluation (For Face Detection) } (f) = y = 0$$

##### ○ **If face detect:**

$$\text{Evaluation (For Face Detection) } (f) = y = \sum_{i=1}^n f_i$$

#### **2) Detection of Expressive Positions Process:**

We use the latest machine learning model to produce the 68 facial points for further study. The 68 expressive points cover the most important features of the face, such as the mouth, nose, eyes and brows, which are well-known in face recognition.

### 3) **Eye Recognition & Segmentation Process:**

When we detect expressive position, we start detection of the eye recognition which include segmentation and the verification, analysis and monitoring of edges and extract and collect the eye images. The evaluation for the eye recognition can be calculated as:

○ **If no eye recognized:**

$$\text{Evaluation (For Eye Recognition) (f)} = x = 0$$

○ **If eye recognized:**

$$\text{Evaluation (For Eye Recognition) (f)} = x = \sum_{i=1}^n (e)_i$$

### 4) **Evaluation For Each Eye:**

When we've had the eye images, we're ready to move on to the next step For each eye, the measures of evaluation is computed as:

○ **If eye is close:**

$$\text{Evaluation (For Each Eye) (e)} = \sum_{i=1}^n (\text{eye})_i = 0$$

○ **If eye is open:**

$$\text{Evaluation (For Each Eye) (e)} = \sum_{i=1}^n (\text{eye})_i = 1$$

### 5) **Evaluation for Measures of Eye:**

According to the attention measures of evaluations, students' attentiveness can be categories into twenty-One dataset stages based on face recognition and eye state such as; Natural, Upset, Happy, Crying, Sad, Disgust, Surprise, Angry, Fear, Sleepy, Panic, Worried, Excited, Tired, Dizzy, Silly, Confident, Joyful, Inspired, Bored and Suspense.

$$\begin{aligned} \text{Evaluation for measures of eye} &= \text{Evaluation (For Each Eye) (e)} + \text{Evaluation (For Eye Recognition) (f)} \\ &+ \text{Evaluation (For Face Detection) (f)} \end{aligned}$$

## **Classification of Eye State:**

For the classification of eye state, we offer to use machine learning approach to automatically calculate the evaluation for the measures of eye. Machine learning algorithms are primarily divided into two parts, feature detection and algorithm for classification techniques. This research paper compares and contrasts a variety of feature extraction and classification algorithms. Principal components analysis (PCA) and Gabor features are two feature extraction algorithms. The k-nearest neighbor's algorithm (KNN), Naive Bayes classifiers (NBC), and help vector machines are among the classification algorithms (SVM).

### **1. Feature Detection**

Feature detection mainly consist of two parts:

- 1) Principal Component Analysis (PCA)
- 2) Gabor Transformation

- **Principal Component Analysis (PCA)**

PCA is a data-analysis and data-simplification methodology. PCA is frequently used to start reducing the dimensionality of a data set whereas retaining the data set's significant contributions to deviations. The low-order principal components are held while the higher-order principal components are neglected. PCA was developed to help people in evaluating data and build mathematical models. To obtain the key components of the data (i.e., function vectors) and their weights, the approach primarily employs the feature decomposition of the covariance matrix. PCA is a powerful tool for lowering costs. When analyzing complex data, such as facial recognition, the data dimension comes in handy.

- **Gabor Transformation**

The windowed Fourier transform includes the Gabor transform. In the frequency domain, the Gabor algorithm will derive related features in various scales and directions. The Gabor wavelet is very close to how basic cells in the human visual system respond to visual stimuli. It excels at processing information from the target's local space and frequency domains. While the Gabor wavelet is not an orthogonal basis in and of itself, it will form a close frame when those conditions are met. The Gabor wavelet is sensitive to the image's edge, has excellent direction and scale selection characteristics, and is unaffected by light shifts. It has a high degree of adaptability to light transitions. Gabor has improved frequency specifications and directional selectivity, which means it can collect spatial frequencies (scales) and local geometrical characteristics in various directions in a small area of the picture. Gabor transformation can be comparable to a sensitive microscope for directions and for dimension measurements. A 2D isotropic Gabor filter is the product of a 2D Gaussian and a complex exponential function in terms of mathematics. The basic expression is as follows:

$$g_{\theta, \lambda, \sigma}(x, y) = \exp - ((x^2 + y^2) / \sigma^2) \times \exp (j\pi / \lambda \times (x \cos \theta + y \sin \theta))$$

Here in this equation, parameter  $\theta$  signifies the orientation location and alignment along with direction,  $\sigma$  symbolized scale at the orthogonal direction and  $\lambda$  is the wavelength. However, using such parameters, Gabor filter and transformation does not measure consistently because in this equation, parameter  $\sigma$  change respectively. Therefore, the use of  $\theta = \lambda / \sigma$  parameter in the equation is more efficient in the replacement of  $\lambda$ . Thus, changing in the  $\sigma$  resembles to an accurate scale change.

And it is suitable to apply a  $90^\circ$  counter in a clockwise rotation so that the parameter  $\theta$  represented the normal direction to Gabor wavelet edge. One can modify the Gabor filter to a specific arrangement existing in a picture by progressively modifying each of the filter's parameters. Consequently, Gabor filter in the mathematical expression can be expressed as:

$$g_{\theta, \gamma, \sigma}(x, y) = \exp - ((x^2 + y^2) / \sigma^2) \times \exp (j\pi / \gamma \sigma \times (x \cos \theta - y \sin \theta))$$

## **2. Algorithm for Classification Technique**

Algorithm for classification technique mainly consist of three parts:

- 1) Naive Bayes classifiers (NBC)
- 2) Support Vector Machines (SVM)
- 3) K-nearest neighbors' algorithm (KNN)

- **Naive Bayes classifiers (NBC)**

NBC is a set of Bayes theorem-based probabilistic classifiers that use strong (simple) hypotheses independence. Since Naive Bayes classifiers are scalable, they include parameters with linear characteristics. In the supervised learning sample collection, it is possible to achieve a very strong classification effect for certain types of probability models. The maximum probability estimation method is used by the NBC in a variety of functional applications. Supervised maximum classification experimentation can be achieved by analyzing a restricted expression instead of the time-consuming iterative approximations that used too many varieties of classifiers.

- **Support Vector Machines (SVM)**

SVM is a machine learning algorithm with minor structural uncertainty and vulnerability, based on statistical learning approach. A support vector machine, in more precise situations, generates a hyperplane or collection of hyperplanes in a high or infinite-dimensional space that can be used for classification, regression, or several other objectives such as image segmentation detection. Accurately, the hyperplane with the maximum distance to the closest training-data particular moment in any class achieves a successful separation. It is commonly used in a variety of machine learning fields. It is particularly well suited to high-dimensional and minor issues, and has excellent development possibilities.

$$K(x, y) = \exp(-\gamma \|x - y\|)$$

Where;  $\gamma > 0$  &  $\gamma$  is a kernel parameter.

- **K-nearest neighbors' algorithm (KNN)**

Since defaulting all adjustments and measurements to grouping, KNN is a case-based learning, local approximation, and supervised machine learning and existing optimization technique. The calculation of the weights of the surroundings is very useful, whether it is for differentiation or regression, so that the weights of the closest neighbors are greater than the weights of the further distant neighbors. for example, a typical weighting scheme, gives each neighbor a weight of  $1/d$ , where  $d$  is the distance between them.

### **Experimental Result**

The following is the procedure for conducting the observation. Initially, a rectangular shape human eye segment is collected depending on the coordinates of both eyes' edges, the surface area however is the real cross - sectional area of the human eye in an automated configuration and analysis of human face characteristic positions. The gray - scale observation and modification are then applied. Eventually, the image is adjusted with a size of  $32 \times 32$  pixels, resulting in Sample sets observed values, from which feature datasets can be extracted using PCA or Gabor. CEW dataset provided observational results. A significant proportion of 2550 closed-eye dataset samples and 2650 open-eye dataset samples were chosen. For preparatory work, we used 1650 closed-eye dataset samples and 1650 opened-eye dataset samples at periodic intervals, while for research testing evaluation we used 1900 dataset samples. Some of the normalized left-eye dataset samples, scaled  $32 \times 32$ , closed-eye dataset samples, and opened-eye dataset samples are shown in the figure given below:

#### **Opened-Eye Dataset Sample**

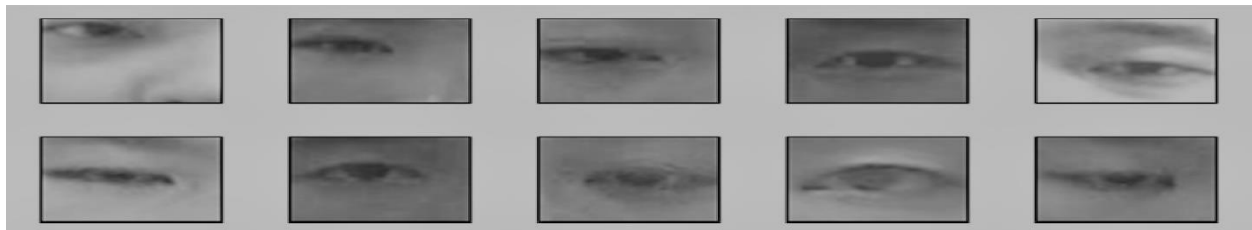


Figure: 1.1



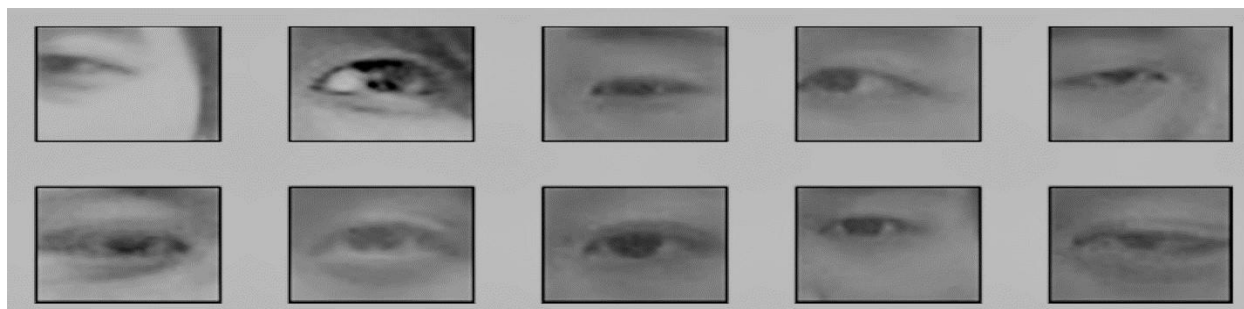


Figure: 1.2

### Closed-Eye Dataset Samples

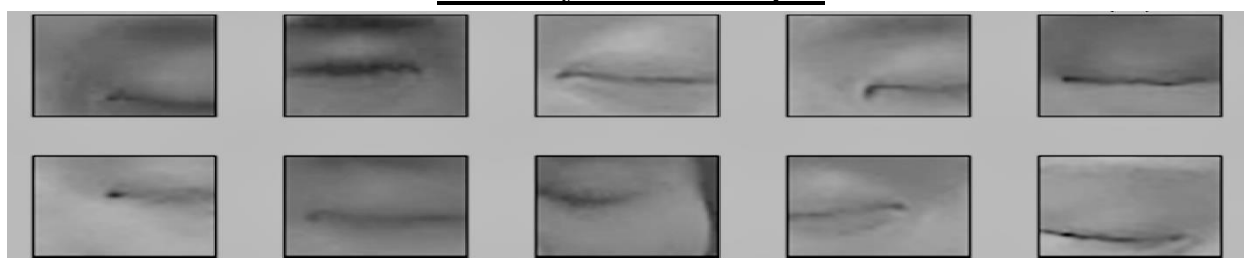


Figure: 2.1

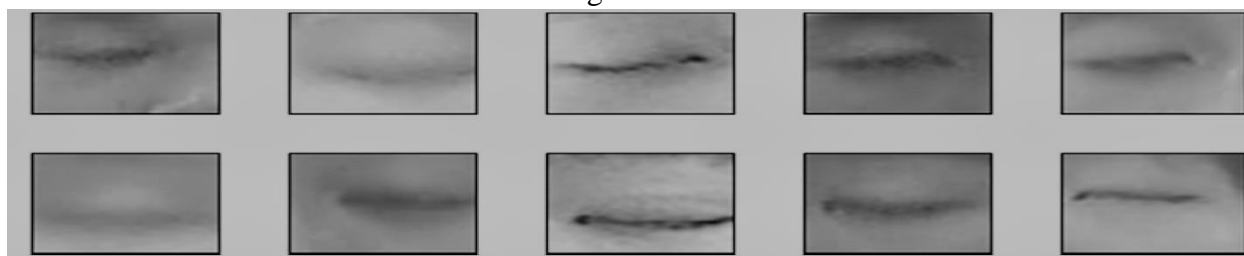


Figure: 2.2

Here we used two attribute of the feature detection and three classification models for algorithm technique in our experimental as well as observational study to analyze and examine the six accumulated models. Table demonstrates the influence of several model's framework. In terms of feature detection of eye states, Gabor characteristics performed much better than

PCA functionalities, as is shown in the Table. Gabor attributes and characteristic significantly works more efficiently than PCA throughout each of the classification models.

**Table**

<b>Classification Model for Algorithm Technique</b>	<b>Feature Detection</b>	<b>Precision In Experimental Result</b>	<b>Percentage (%age)</b>
<b>Naive Bayes Classifier</b>	Gabor	0.934	93.4
<b>Support Vector Machine</b>	Gabor	0.957	95.7
<b>K-Nearest Neighbors</b>	Gabor	0.910	91.0
<b>Naive Bayes Classifier</b>	PCA	0.725	72.5
<b>Support Vector Machine</b>	PCA	0.815	81.5
<b>K-Nearest Neighbors</b>	PCA	0.874	87.4

## **Conclusion**

Throughout this journal, we specifically desired to enhance the uses of participants' perceptual participation and engagement in online distance classes. Somehow this research paper introduces a machine learning-based eye state recognition model. The results of the experimental analysis and observational study demonstrate that such methodology and technique is efficient and effective. Here we are using a various combinations of Principal component analysis, Gabor attribute and functional parameters, and K - nearest neighbors, Naive bayes, and Support vector machine as a classification model for algorithms technique to examine and analyze an effective range of geometric pattern classification modelling techniques. We examine that the implementation of Gabor and Support vector machine seems to have the considerable and efficient observational results, when we examined such frameworks. Here the computational result is 95.7 percent, which is very useful and applicable in real-world implementations.

Furthermore, depending upon established machine learning techniques, we developed a methodology for advanced computerized automated facial expression recognition. These frameworks minimize time period and have more accuracy than manual identification. As a result, we argue that our developed methodology scheme has not merely achieves reliable results and performance in eye state assessment, but it seems to have functional utility. The advancement in technology achieved throughout this research paper are intended to have well organized approach. To increase the effectiveness and significance of the results, intra- and inter analytical techniques and research methodologies are also taken into consideration. The observation and outcomes of this research paper are intended to encourage and promote some further investigation and experimental efforts. To expand and maximize the significance as well as reliability of the assessment, intra- and inter methodology and analytical technique designs are

also needed. The study's drawback is that it just looks at the influence of open and closed eyes of the participants. Whereas the research demonstrates how active (open) and inactive (close) eyes are the most important variables in measuring participants' focus and attentiveness during online classes. Several other factors, such as frequency and regularity of participant voice, have a significant impact on participants maximum attention levels in online classes. However, we should utilize the suggested and recommended method to investigate other observations and measurements in the future.

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