MITS STORE MANAGEMENT SYSTEM

MINI PROJECT
ADD334

Mini Project Report submitted in partial fulfillment for the degree
of
B.Tech Artificial Intelligence & Data Science

Submitted by

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DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

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CERTIFICATE

This is to certify that the mini project report entitled **"MITS STORE MANAGEMENT SYSTEM"** submitted by **AARYA M S (Reg No: MUT22AD002), ALISHA MARY SHIBU (Reg No: MUT22AD015), ATHULYA S (Reg No: MUT22AD026),NANDANA R (Reg No: MUT22AD056)** of Semester VI is a bonafide account of the work done by them under our supervision during the academic year 2024-25.

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Abstract

In our college, students face significant difficulties in obtaining prints and purchasing store supplies due to overcrowding during short breaks. Many students struggle to get their printouts on time as bulk printing delays the process, making them late for classes. Additionally, store supplies often run out quickly, leaving students unaware of stock availability and causing them to waste time visiting the store only to find items out of stock. Here comes the relevance of our system.If a student needs to print documents, they usually visit the store during breaks, leading to congestion. Our proposed system aims to streamline this process by enabling students to place print orders online, specifying the number of copies and documents to be printed. The system also facilitates online payments, allowing students to complete transactions without waiting in long queues. Additionally, the website provides real-time traffic updates, helping students decide the best time to visit.In terms of stock management, store administrators can update product availability in real time. Students can check the stock status before heading to the store, preventing unnecessary trips. By integrating print order management, traffic tracking, and stock updates into a single platform, our system reduces wait times, minimizes overcrowding, and enhances convenience for students, ultimately improving their overall experience.

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List of Abbrevations

YOLO	You Only Look Once
SVM	Support Vector Machine
MTCNN	Multi task Cascaded Convolutional Neural Network
DADA	Deep Adversarial Data Augmentation
NCRB	National Crime Record Bureau
VGG	Visual Geometry Group
GAN	Generative Adversarial Network

Chapter 1

Introduction

1.1 Motivation

Managing print orders and store inventory efficiently is crucial for improving students' daily routines. Currently, students experience delays due to long queues, especially when a single student places a bulk print order, disrupting others who need urgent prints. With short break times, these delays lead to students missing important class hours. Additionally, essential items in the store often go out of stock within a day, leaving students unaware until they visit the store, causing unnecessary inconvenience.

A system that allows students to place print orders online, track store traffic, and check stock availability can significantly improve efficiency. By reducing long waiting times and preventing unnecessary store visits, this solution helps students save time and focus on their academic responsibilities. Implementing a digital platform will not only streamline operations but also enhance the overall student experience at MITS.

1.2 Problem Statement

The aim of this project is to streamline the management of print orders and store inventory at MITS to reduce student inconvenience. Students face significant difficulties in obtaining prints due to overcrowding during short breaks, often resulting in delays that make them late for classes. Additionally, bulk printing by a single student further disrupts the process, causing frustration among others waiting in line.

In the current system, students must physically visit the store to check stock availability, which leads to wasted time when essential items are out of stock. There is no real-time mechanism for tracking store inventory or monitoring print order traffic.

Our proposed system addresses these issues by allowing students to place print orders online, make payments digitally, and track store traffic to plan their visits efficiently. Additionally, real-time stock updates will help students make informed decisions before going to the store, ultimately improving convenience and reducing unnecessary delays.

Chapter 2

Literature Review

2.1 Research on Face Detection Technology Based on MTCNN

Detection is an important sector of object detection and research detection. For the input image, the face position is returned. There are three steps for the phases of face recognition having deep learning:inputs of data, extracting the features of image , and recognizing the features of a face, among this extracting features is the most crucial phase.Given paper[1] tries to compare and contrast properties of stage level (one and two) recognition strategies and their procedures for recognizing faces. Also, we analyze MTCNN (Multi-task convolution neural network) in detail to introduce principles that include its implementing steps. The practical effectiveness of MTCNN on object recognition tasks are evaluated by experimental step.Results from this model are compared with similar approach yolo-v3 results for the dataset wide faces. Object recognition is the most important procedure in the era of computer technology that has ongoing studies for more than twenty years. From the application point of view, final mission identifiers include normal mission identifiers, expression final mission identifiers . Within that, common detection of targets contains detection of face, detecting pedestrians, detecting vehicles, detecting objects etc. Detection of necessary objects shall mimic all impact in retrieving significant items of human visual photos of target detection outputs. In the mentioned article[1] , we usually consider all uses of MTCNN in this facial recognition. As we move ahead in this learning to reach the target, you will gain an in-depth knowledge in the relevant areas of applications in the field of computer technology and master the general ideas of various final mission identification steps. Further, by implementing this technique, we can get to know about the basic features of the object recognition method. Compared with the conventional highly accurate object images, stand-off, lower pixels and irregular lighting situations invites most of the tough and demanding object recognition and locating correct face key points. The processing of this approach focuses on generating many rectangular units or boxes with distant lengths for the facial information by transforming through many transformation scales, performing smooth recognitions for the face images, then drawing and recognizing the characteristics in the

rectangular units. Consequently, there are several overlying target areas for the same possible image targets. Non maximum suppression method is applied in this MTCNN algorithm to obtain a greater accuracy for detecting faces. NMS can be understood as local maximum search. The goal is to remove multiple heavily matched units or boxes of the identical result in order to detect the best output boundary. First, the frame or box in the result that contains the greater confidence value is selected, further the IOU range of the rest of the available frames and the highest target boxes are calculated. By receiving a mean accurate value, entire available frames with an IOU value higher than this threshold are discarded , thereby removing the same cross-target areas.

2.2 Missing Child Identification System using Deep Learning and Multiclass SVM

The number of children that are missing is very large in India . Majority of them are still unfound. The article[2] demonstrates a new path of application for deep learning techniques to identify a reported missing child from a variety of available photographs of her children using facial recognition. Photos of the suspected children can be uploaded to the sharing portal for marking and commenting. The system checks these photos with the existing ones in its database. The input image is classified and the best match is taken from the database with high accuracy. For this, a model of deep learning is used for a highly accurate match of a photo in a database with the input image of a suspected child, based on publicly uploaded face images . Convolutional Neural Network (CNN) is used here for detection of face and is a deep learning technique of high effectiveness . Various descriptions from face are taken out using an already trained model of CNN, VGG Deep architecture for face. Child detection is fulfilled by classifiers of SVM which are trained,convolutional networks for extracting features of high level. Select convolutional model with the best performance for recognising the face, and train this properly model of deep learning which is not variant to lighting, sound, saturation, pose and other such attributes of the image, and age of child It yields missing kid face recognition that overwhelms previous methods of identifying the missing kid. The system achieved a classification performance of more than 99%. Forty-three children were evaluated for this purpose.

They present a system for identifying children gone unfound that mixes features taken out from the face to deep learning and synchronizing which is mostly depending on a support vector machine. Given system uses recognising of face to identify the unfound children. This will help authorities and her guardians investigate the missing child. The photos of kids which are unfound are stored in a database, facial regions are selected for cropping, and the input facial images are obtained. Features learned from a convolutional network are used to train a multiclass classifier of support vector machine. This learning strategy is used for accurate children using names provided inside the repository given by data from competent authorities. A CNN or ConvNet consists of layers

which are connected in between and are in series, the layers consists of convolutional blocks which are repeating, ReLUs (units which are rectified in linear), layers which are pooled, and layers which are connected fully increase. The layer of convolution convolves the photo of input image of kid with various kernels that generates feature or maps of activation showing features of low level like edges.

2.3 Deep Adversarial Data Augmentation for Extremely Low Data Regimes

Learning deeply always contains an evolving power of differentiating and item recognition, however now requires an accurately classified image for training. Many techniques have been developed to face insufficient data and deal with overfitting, but it remains a challenge when trying to train deep networks, especially under very low data regimes with poor settings. Only a small amount of guided information is provided and the rest is unlabeled cases. To address this issue, we put forward Augmenting data with adversarial that is deep (DADA) techniques. In this technique, we formulate data augmentation in detail and describe it as the issue for guiding category-constrained, externally guided, networks that are generative adversive (GAN). In particular, latest discrimination losses are put forward to meet the aim of augmenting data. This helps all the real and generated datas to find decision boundaries while remaining consistent. Tailor-made guides evolved later.

To measure the overall accuracy , it mainly performs large-scale experiments to prove that this technique significantly defeats both conventional image expansion and some gan dependent methods. It further extends the experiment to several small labeled actual differentiation datas where present datas already augmented or methods of learning through moving are ineffective or unsuccessful. It further shows this method can be taken to higher levels of recognition tasks. Improve pedestrian synthesis method by replacing the differential and guiding process. Further testing and evaluation shows that this method can advance the average identification accuracy compared to conventional data advancement procedures in task identification. This article[3] focuses on increasing the effectiveness of image expansion, which can be improved to classify common images without depending on province-dependent prior or unguided information. Introducing learning-based image advancement. The data augmentation feature and the differentiator are formed as an externally guided network with an adversarial generative model and learned together. This is called data advancement of deep adversarial networks. This paper[3] proposes the latest function for the differentiator that tries to understand the correct images . This is called a 2k loss, on the other hand to the k+I loss applied in some available GANs. This paper[3] then performs further simulations on C1FAR-IO, C1FAR-IOO, SVNH to coach a higher classifier on a much smaller data region, comparing it to using traditional data augmentation, showing a significant performance improvement with DADA.

2.4 The Neural Network Technologies Effectiveness for Face Detection

This paper[4] is devoted to evaluating the effectiveness of using convolutional networking for recognising faces. A comparison of the training of the neural network and the efficiency of its functions is performed on standard open data sets. We draw conclusions about the real world use for recognition of face with neural networks in photographs which are digital. While taking the case of biometrics, recognition of face is very much crucial and challenging. Recognition of faces in images which are digital has many uses for the solution of real-world challenges, including infotainment , knowledge, health. Till date, there are many ways or algorithms and techniques to solve these challenges. Old techniques such as the algorithm of VJ does face detection, but their performance suffers when the input image is distorted. Deep learning being evolved and neural networks which are convolutional(NNs) has made it possible for researchers to find complex neural networks. With proper training, this algorithm will perform better in various aspects of physical attributes. In addition, each emerging neural network-based algorithm has characteristics and properties that boosts the efficiency of various applications. The YOLO which came first was designed with constraints of being faster and being efficient. R-CNN, which existed at that time, was way too slow and was unable to be implemented in real-time. The YOLO first introduced has the benefit of speed and efficiency than R-CNN, but accuracy was way too slow.So YOLO was then improved in terms of efficiency but gradually decreased down. When YOLO wasn't introduced, the model of RCNN had two different pipelines of strategies. Determine the area in which the object may be located and whether the network working object to detect is within the suggested area. The YOLO which was first introduced was able to join these two algorithms to a singular neural network. This is achieved by splitting the photo into subdivisions within a grid of squares. Each cell is equally important in predicting boxes which are bounding and values for each of the frames. In this article[4] , they compared models of neural networks- YOLO and MTCNN, applied to face recognition tasks.The popular neural network of R-CNN which is faster, was not included in the comparison due to lack of resources for proper training. YOLO is a general network of object recognition that can recognize objects including faces. MTCNN is exclusively used for recognition of face.The most recent and updated sub of YOLO is YOLOv3. MTCNN has only three simple networks but its algorithm is way too complex and also does lots of operations on data given as input.Experiments were taken on data sets of faces which are wider. The model of YOLO is being trained with weights which are already trained. The model of MTCNN was used with weights which were completely trained before. Use precision of mean and precision of x recalling bents as attributes of comparison.

2.5 Tracking the Object Features in Video Based on OpenCV

Goal of this article[5] includes the working and implementation of the procedures for observing properties of objects, especially human hands in video. Currently available solutions require exceptional objects such as indepth sensors to work.The above mentioned article[5] is intended to capture facts of these objects using the highly obtainable camera objects . The proposed system includes input images from real t1me environments and takes information from internally kept files or combined cameras devices. The output always functions as data humans and computers, allowing other programs to be controlled by analyzing and processing images of human hands. This solution provides results in different strategies. The above explained equipment is introduced as an equipment with a highly designed user intersection that controls various variables that affect the processing of input data.

In this paper[5] , they present an algorithm that uses pieces of data taken from a technical photo of a hand gesture to provide the ability to remotely control software. Similar work is done by a designer of interfaces between people and machines. The main common and same machine is the Microsoft Kinect, however we are discussing a different mechanism in this article. Kinet uses a sensor that has different light depth to extract properties of objects, however the overall execution and the object in the document can process images from common cameras. At the beginning of the article, we introduce machine vision methods and algorithms. Understanding these methods is essential to understanding and proposing mechanisms of our type. Synthesis is reliant and reminiscent of the algorithm mentioned in. The main part of this article[5] presents proposed solutions. The overall solution is executed in a laptop or desktop app containing the Python program and the python open source computer vision library. The completed execution has a graphical intersection executed with the externally available PySide binding file, providing a convenient platform for both hard steps and the user.The algorithms proposed in this article fall under visual-based platforms. A hand gesture can be seen through the particles of a digital equipment and photo is transformed into digital picture. Digital images are something higher than matrices of invariable and direction data(depending on how the image looks monochrome or color) and it may be executed in many different paths. Here you can use the OpenCV library, which is better for other tasks. An object's photomask is known by their silhouete. A digital form of similar silhouete is known as dual picture. Binary is known as the lowest item or object (pixel for this example) that can be shown by 0 and 1 (O - 255).

2.6 Face Detection Based on Receptive Field Enhanced Multi-Task Cascaded Convolutional Neural Networks

As deep learning is improving day by day,recognition of face has made a great advancement. For live monitoring, cascading CNNs of simple models are still the leading and use powerful generalization

capabilities to predict coarse to fine faces. Doesn't require fixed size inputs compared to other methods. However, MTCNN still performs poorly on his detection of small targets. They introduce a receiving of enhanced field multitasking cascade Convolutional network to advance the ability for generalization of the model. This network utilizes the starting V2 sector and the received block of field for improving identification of feature and efficiency for targets which are small. Results from tests proves that improves network efficiency by 1.08 percent on AFW, 2.84 percent on PASCAL FACE, and 1.31 percent on FDDB, and three sub datasets improve WIDER FACE benchmarks by 2.3%, 2.1%, and 6.6% which indicates what you have at MTCNN. Additionally, this system uses 16 percent of lesser parameters. Recognition of face is the basis of computer application and recognising patterns, a basic part in face-involved strategies like face recognition, monitoring and verification. As a result of lots of studies and research, facial recognition has been implemented in various day to day applications. Live monitoring, pervasive. It has developed into a researching field in the technology of video imaging. His conventional MTCNN uses convolution which is standard. As the deepness of the network rises gradually, so does its field of reception. This helps detect large faces, but not small ones. We consider the block of V2-Inception and its block of field received to improve the field of reception of map features using the multiple branches.

Detection of face and tasks of face alignment tasks are integrated using MTCNN with an integrated cascade CNN with multitask learning. More than two networks are included in MTCNN. The very beginning network is the Proposal Network(P-Net), keeping windows of candidates and the regression of boxes which are bounded vectors and considers non-maximal of suppressings (NMS) to concatenate heavily overlapping grids. increase. The next network is the Refine Network (R-Net), which is used in sorting out a huge amount of odd candidates from this part, using regression to refine the bounding boxes. Finally, the last among networks, called the output network (O-Net), uses the windows of candidates which are final and a deeper network to output the positions of five facial landmarks. We introduced RFB to P-Net by combining properties from MTCNN as well as blocks that enhance the field of reception.Enhance the features of the networking neural and retain parts of the mapping feature to obtain many boxes which are accurate.

2.7 Object Detection With Deep Learning: A Review

Since face recognition is almost similar to video synthesis and photo recognizing ,in the coming years it will surely include much of the research areas. Conventional face recognition steps depending on hand-crafted functions, flat, understandable structures. The faster evolving of deep neural networks has given birth to most of the effective equipment capable of learning syntax, higher-levels, and higher properties to address mystery present in conventional structures. Most of these systems perform effectively in their architecture, teaching strategies, and include accurate capabilities. This article[7] provides an overview of detecting objects depending on the deep learning framework. The abstract starts with small theories of history including machine learning and their flagship

equipment, traditional multiple networks. Since different specific detection tasks have different characteristics, some important properties consisting of detecting a walking person are also briefly discussed. Experimental analyzes are again given to study different algorithms and to reach optimal conclusions. At last, most of the effective steps and procedures are given to supply with the guidelines for further studies in the item recognition also related to multi-layer based on mechanism of teaching and learning.

To fully understand an image, we must not only include focusing on differentiating the several types of photos, however we also strive to accurately find the concept and location of the faces present in several photos. This method is called recognition of items and is commonly used in various applications including detecting face , detecting a walking person and detecting a skeleton.As everyone knows the basic computer related task, face recognition can always give us with the most important data for making sense of photos and pictures, image classification , human behavior, and so on. It is relevant for many applications such as analytics. facial recognition , autonomous driving. On the other hand, progress in these fields also has a significant impact on object recognition technology, which is adopted from a multi neural layer and combined system of teaching and learning, develops algorithms for neural networks, and can be seen as a self-studying nature. The above mentioned problem includes a complete overview of machine learning depending on the face recognition framework and addresses various sub-problems such as the review of generic object detection that provides the basic architecture for other related tasks. It starts with the detection pipeline. Finally, to fully understand the situation of object detection, we put forward some of the most useful future scope in this field.

2.8 Face Detection and Recognition Using OpenCV

Facial recognition is a computer technique that determines the position and size of human faces in a video or image. Recognizes facial features and ignores buildings, trees, bodies, and everything else. Human visual perception is his area currently being actively researched within the computer vision community. Locating and identifying human facial features is usually the first step in applications such as video surveillance, human-computer interfaces, facial recognition, and image management. Although generalized face images are often available, human face identification and tracking may be required for face recognition and/or face analysis. The main issue with the machine-aided facial understanding with undistorted facial information as examination remains a mainly unexplained research method. Considering how humans recognize faces and how they differ from verification machines, it is interesting to note how machines prefer different facial features to difficulty in recognizing faces. Therefore, in this paper[8] we consider a problem involving the plan of image recognition including insufficient facial data. This analysis is dependent on the correct classification and identification of faces using the language including object related concepts and python open source computer vision library. This paper[8] implements a Haar classifier for face detection and

tracking that supports Har features. Automated Face Analysis, Pattern Recognition, and Machine Learning Recent advances have enabled the development of his automated face recognition system for these applications. On the one hand, recognizing faces can be a natural act. Because people usually roll the hay effortlessly and without much awareness.

On the other hand, applying this technique to the field of computer vision remains a difficult problem. As part of the biometric authentication process, automatic facial recognition has many desirable properties. Facial recognition is a computer technique that determines the position and size of human faces in a video or image. Recognizes facial features and ignores buildings, trees, bodies, and everything else. Although generalized face images are often available, human face identification and tracking may be required for face recognition and/or face analysis. The issue of machine-aided facial identification of undistorted facial information as examining remains a highly unsolved research field. Therefore, in this paper[8] we consider a problem involving design of detecting faces using inefficient face data. This study is dependent on the correct classification and identification of faces using the object related concepts and python open source computer vision library. This paper implements a Haar classifier for face detection and tracking that supports Har features.

2.9 Face Recognition using Light Convolutional Neural Networks Based on Modified VGG-16 Model

Today's identification systems recognise a person's identity using biometric technology like facial recognition, retina scans, fingerprint mapping, etc. Face detection, face alignment, feature extraction, and classification were all time-consuming processes in the conventional face recognition systems. Deep learning, which combines feature extraction and classification into a single architecture, has lately grown in favor as a result of these disadvantages. Convolutional Neural Network (CNN or ConvNet), a Deep Learning method, has achieved great success in face recognition applications. However, the most of CNN models have very deep layers and were trained using a very large dataset, b of which both needs a lot of computer power.With a very small dataset, a light-CNN based on a modified VGG-16 model is suggested in this study for face recognition. Although the suggested algorithm is small, it performs well, with an accuracy of 94.4

The major purpose of this paper[9] is to construct a light-CNN model based on previously existing models like VGG-16 that performs well on small datasets. The 251 and 512 filter convolutional layers, as well as one of the 64 filter convolutional layers, are entirely deleted in the proposed light-CNN model, which is based on the existing VGG-16 model. Layers that are totally connected have different sizes. The VGG-16 model's architecture has been made lighter and more compact by deleting some layers. The size of the input image was decreased to 120 by 120 pixels. There are training and testing phases in every operation. The labeled input dataset is shrunk to a

uniform size of 120 x 120 pixels during the training phase.And the suggested architecture is used to train the model. The images captured by webcams and video cameras are then cropped and enlarged to match the input image's standard size during the testing step, using the trained model. A threshold is used to pass inputs with a confident score above the threshold and to discard inputs with a confident score below the threshold after applying the previously trained face recognition model to the input image.

We employ a confusion matrix to assess the overall performance of the suggested model. Accuracy, precision, recall, and F1 metrics are computed using this confusion matrix. The suggested approach makes use of a dataset that has 30 labels for RGB-formatted facial photos. Using the face detection algorithm from the OpenCV library, any face found in the movie will be automatically cropped. The dataset, which consists of 7,250 face photos, will be split into 2,175 for validation and 5,075 for training. The experiment will make use of a fresh set of 484 facial photos. The feature extraction stage is the most crucial of the four stages involved in face recognition. This experiment demonstrates that light-CNN can likewise generate high accuracy, at 94.4% and can also perform better in limited dataset and small number of labels.

2.10 Criminal recognition using light convolutional neural networks based on modified VGG-16 model

Face recognition is a biometric method that creates a mathematical map of a person's facial features and stores the information as a face print. This applies machine learning to the image and creates a feature vector that associates a set of numbers with each object in the image. This study suggested using this technology to find missing children and offenders. Images or video frames installed in various places can be used to identify these perpetrators. The search for missing children might also employ this method. The primary drawback of the images produced in this way is that they could be blurry, less clear, and impossible for the human eye to distinguish. The proposed system can recognise multiple people simultaneously, which speeds up processing.Each image is given a special template, which is then compared to the dataset that is available. If a match is made, the information related to the image will be shown. The goal of this essay[10] is to lower crime levels in our society.

The process of obtaining data and information from a website using a web browser or directly through Hypertext Markup Language is known as web scraping. Haar Cascade Classifier is used to find faces in rotated or blurred images. The current method relies on static data and needs a considerable training period for the face dataset. By, there are just two steps in this proposed system: • Image Acquisition: The user provides the image through an interface. • Face detection: The Haar Cascade Classifier is used to detect faces. • Web scraping: For web image scraping, BeautifulSoup and the Python request library are used. • Feature Extraction: OpenCV is used to

extract the features from the input image. • Template comparison: The input image is compared to the face vectors. Different types of photos, including blurry, distant, childhood, and Aadhar card images, are used to test the system. It uses the flask programme to compare the input image to web photos, then displays the comparison to assist in determining whether or not the user is a criminal. The comparison of multiple photos in this research and the degree of precision of the results are really pleasing. Both pictures and videos play smoothly on the system. 90% of the results are accurate. When compared to alternative approaches, the time and space requirements are lower. Criminals and missing persons can be quickly located with this system, which is dynamically updated.

2.11 Face gender recognition based on face recognition feature vectors

In the realm of computer vision, automatic face gender detection is a common problem that is fairly simple for humans to perform but extremely difficult for computers. An algorithm for face recognition based on face recognition feature vectors is suggested in this paper[11]. First, the input image is subjected to face recognition and detection, and the input is modified to a uniform format. Secondly, the algorithm is used to extract a feature vector from the received input image that serves as a representation of the face in feature space. The feature vectors are then classified using ML. On the FEI and SCIEN datasets, the suggested method has a recognition rate of 99.2% and 98.7%, respectively.

The human face is a distinctive biological feature that incorporates a variety of biological details, including face shape, skin type, skin color, facial characteristics, and more. This issue determines if the input is a male or a female in a binary categorization. Data collection, pre-processing, feature extraction, classification, and performance evaluation are the typical five main phases involved in this process. A Deep Convolutional Neural Network (DCNN) based face recognition model can now successfully determine a person's identity. This study uses feature vectors on several datasets to achieve excellent accuracy rates.

There are two stages in the face gender recognition process: the training stage, when the model is being trained using a training dataset, and the testing stage, where the face gender prediction is carried out. The following steps comprise the training stage: • Face Detection: This stage's goal is to identify the exact position of the face in the image. The face detection technique given by Dilb is utilized in this paper. • Pre-processing: After the face is recognised in the input image, the face's key points are predicted, and the cropped image is then affine transformed using the data from the key points. • Feature extraction: This process is crucial. The input will be recognised more frequently when effective characteristics are obtained, however the majority of invalid features will interfere with recognition and reduce its effectiveness. • Classification: The

issue is changed into a feature vector classification issue. In this study, various widely utilized machine learning algorithms—K closest neighbor (KNN), support vector machine (SVM), random forest (RF), and logistic regression—are employed to categorize feature vectors (LR). • Evaluation: Using the Research Rate in the article (RR).

2.12 Face recognition system using machine learning algorithm

A common issue with artificial intelligence is face recognition. Our daily lives made significant use of this programme. A number of cellphones were opened with face recognition to protect personal information and utilized on Facebook to immediately recognise when Facebook users appear in images. Face recognition has been approached in a number of ways up to this point, but it is still exceedingly challenging in practical settings. A key method of differentiating persons depends on a number of factors, including partial face occlusion, lighting, and variation in posture. With the help of a machine learning algorithm and principal component analysis, this paper[12] aims to design a face recognition method. Support vector machines, multilayer perceptrons, Naive Bayes, and linear discriminant analysis are used in the experiments.

This procedure involves separating facial traits from the unsteady surroundings and probably real faces, then validating them. The first attempt to identify a face involved calculating distinctive facial features including nose size, brow breadth, and forehead area. The newest technology includes face recognition as an authentication technique. Apple and Samsung, two manufacturers of smartphones, have released their latest models with facial authentication capabilities. In this study, an inquiry is used to identify a person's face automatically. The ORL dataset is used for experimentation. The dataset is first divided into two sections with the following configurations: A (60:40), B (70:40), and C. (90:10). The first section is used for educational purposes, and the second section is used to evaluate the system. Using PCA, the essential data is retrieved from the input images. Later, it is tested using support vector machines, multilayer perceptrons, naive Bayes, and linear discriminant analysis. By combining PCA with linear discriminant analysis, these have obtained identification accuracy of 97% for configuration B and 100% for configuration C. More face detection challenges, like orientation variation, illumination, poses, and facial expression variations, will be discovered in the future by examining other databases, like the GTF and YALE dataset. Additionally, this research can be improved by applying and testing additional face detection methods.

2.13 Human Face Detection and Recognition in Videos

New video processing applications for biometric detection and facial identification are now possible thanks to advancements in computing. The application incorporates gesture analysis, facial detection and recognition built into surveillance systems, etc. Sequential photos with a face and

intricate background objects are the initial phase in real-time face detection in practical face analysis systems. A system for detecting and recognising human faces in videos is developed in this paper. Processing times for detection and recognition operations are minimized. The system is broken down into three phases: motion detection, face detection, and recognition. This decreases human intervention while increasing system efficiency. The complexity of processing systems and the search space are both decreased by motion detection. Here, the machine detects the haar face using background subtraction. The performance of the system is impacted by the additional computation time required for background subtraction. The benefit of using this degree is a narrower field of study. Only in the area specified by this step is the face detected at a subsequent level.

The face, which has many unique traits, is a significant biometric component of human anatomy. Face detection in videos is done using the well-known hair detector. To save on calculations, the hair detector was devised utilizing an integral image. The calculations involved in converting a two-dimensional image to a one-dimensional image are significantly reduced using the Eigenface approach. In 1771 frames, 1518 frames with background subtraction and 2857 frames of all effective video faces were discovered without it. Each video's opening frame was modeled in this evaluation as a background frame. The backgrounds of some video frames contained a moving object. In these situations, the performance of the background modeling suffered. These techniques have a wide range of potential real-time applications, such as surveillance systems that can set off an alarm when an unknown individual is spotted on the property.

2.14 Research and Implementation of Face Detection, Tracking and Recognition Based on Video

Many cutting-edge technologies, including facial recognition technology, are heavily reliant on computer vision as a result of the ongoing development of computers. The camera records video streams or photos with human faces in them, and it recognises and tracks those faces. This related technology of his series is also called face recognition or his recognition. Face recognition methods are more natural, more intuitive, indirect and synchronous. Widely utilized throughout many industries. The field of computer vision is currently engaged in research.

In this area of computer vision, this essay[14] investigates techniques for face detection and identification. PyQt, which implements the functionalities of face model training, recognition target picture reading, recognition target image extraction, and human face recognition, was used to develop the user interface. The proposed technique contains a full algorithmic system based on face recognition, according to experimental results, and it realizes face recognition. This can serve as a solid starting point for further study on visual features.

The paper's[14] face detection and recognition system is implemented on the Python Linux platform, and EigenFace, Fishface, and LBP techniques from the OpenCV library are used for

face model training. The three algorithms are then put through performance testing, and via experimentation, their advantages and disadvantages as well as potential applications are examined. Face recognition is an extremely challenging topic. It is challenging to get a good detection effect utilizing simply the current methodology. It is possible to adequately describe facial traits by combining local and global facial information. The techniques of multifunctional and multi classifier fusion are also ways of enhancing recognition performance at the same time.

2.15 Image Enhancement for Surveillance Videos using Quick Browsing system

Large numbers of surveillance cameras have been installed in major cities to observe and document human activities for various purposes. It would take a tremendous amount of labor to view hours and hours of surveillance footage to find a single target because surveillance cameras frequently capture all occurrences for hours at a time. So there is a demand for a system that allows the user to quickly search for his interesting targets.

This article[15] offers his high-speed surveillance video browsing system with color image enhancement. The main concept is to compile all moving objects in the surveillance video that provide the most crucial information, then match their positions to create a comparable compact movie. While maintaining the temporal link between moving items, compact video repositions the spatio-temporal coordinates of moving objects to increase compression.

The main action from the original surveillance footage can be preserved in a small video. This document[15] provides details on searching systems and an approach to creating compact video from source surveillance video. The end result is a high resolution compact video. This document uses a quick browsing system to shorten the video length of Surveillance videos. Create a reliable background model for finding motion between two frames, suppress unwanted frames in preprocessing, enhance the image using adaptive filters, and finally convert all these frames to video (Quick Browsing System).

Chapter 3

Proposed System

3.1 Objectives

This project aims to enhance the efficiency of print order management and store inventory tracking at MITS. By implementing a digital system, the goal is to reduce overcrowding, minimize waiting times, and provide real-time stock availability updates. The system ensures a seamless experience for students by integrating online print ordering, digital payments, and store traffic tracking.

If a student needs to print documents, they can place orders through the website, specifying the number of copies and documents to be printed. This eliminates the need for long queues and manual transactions. Additionally, a stock management feature allows store administrators to update product availability in real time, preventing students from making unnecessary trips to the store.

The current manual system leads to inefficiencies, delays, and wasted time. The proposed system automates these processes, making print services and store management more convenient and accessible. By leveraging technology, the project aims to improve student productivity, optimize store operations, and enhance the overall campus experience.

3.2 Methodologies

In the proposed system, students can place their print orders online by uploading documents and specifying the number of copies required. The system processes the request and allows digital payment, eliminating the need to stand in long queues. Store staff can then manage and fulfill the orders efficiently, reducing delays and congestion during short breaks.

The system also provides real-time traffic updates, enabling students to check the current crowd levels at the store before visiting. This helps them plan their trips accordingly, preventing unnecessary waiting times.

For inventory management, store administrators can update product availability in real time.

Students can check stock levels through the website, ensuring they do not make unnecessary trips for out-of-stock items. The system notifies users when specific products are restocked, improving accessibility to essential supplies.

By integrating online print ordering, traffic tracking, and stock management, the proposed system enhances efficiency, reduces student inconvenience, and optimizes store operations on campus.

3.3 Proposed Solution

In the proposed system, students can upload their documents for printing through a web-based platform, specifying the number of copies required. The system processes the request and provides an online payment option, eliminating the need for students to wait in long queues. Store staff can then efficiently manage and fulfill the print orders, reducing congestion during short breaks.

The website also features real-time store traffic updates, allowing students to check the current crowd level before visiting. This helps them plan their visits more efficiently and avoid unnecessary delays. Additionally, the system includes a stock management feature where store administrators can update product availability in real-time. Students can check the stock status before heading to the store, ensuring they do not waste time searching for unavailable items.

The system is developed using Flask with Python for backend functionality and HTML for the front-end interface. SQLite is used as the database management system to store user information, print order details, and stock updates.

3.3.1 Overview

The MITS Store Management System is designed to enhance efficiency by integrating print order management, online payments, real-time traffic tracking, and inventory updates into a single platform. By automating these processes, the system reduces waiting times and improves convenience for students and store staff.

3.3.2 Print Order Management

Students can upload documents, specify print details, and make payments online. The system queues orders and notifies store staff, ensuring smooth order processing without unnecessary delays.

3.3.3 Real-time Traffic Tracking

A traffic monitoring feature allows students to check store congestion levels before visiting, helping them avoid peak hours.

3.3.4 Inventory Management

Store administrators can update stock availability in real-time, ensuring students are aware of product availability before visiting. Notifications can be sent when items are restocked.

By leveraging Flask, SQLite, and HTML, this system provides an effective solution to improve store operations and enhance the student experience at MITS.

3.3.5 Installing the YOLOv5 Environment

We must first clone the YOLOv5 repository and install any necessary dependencies before we can use YOLOv5. By doing this, we will prepare our programming environment for the execution of commands for object detection training and inference.

3.3.6 Yolo-v5 architecture

Figure 3.1: Architecture of YOLO v5

Like other single-stage object detectors, YOLO v5 contains three crucial components because

it is a single-stage object detector. Model Neck, Model Head, Model Backbone.

The basic purpose of Model Backbone is to extract significant features from an input image. To extract valuable, important features from an input image in YOLO v5, the CSP — Cross Stage Partial Networks are employed as the backbone.

The primary purpose of Model Neck is to produce feature pyramids. Pyramids of features enable models to scale objects successfully in general. The ability to recognise the same thing in various sizes and scales is helpful.

The final detecting step is primarily carried out using the model Head. It used anchor boxes on the features and produced final output vectors that included bounding boxes, objectness scores, and class probabilities.

3.3.7 Testing phase

The trained models are put to the test in this module using the remaining patch dataset as well as any available face photos.

Chapter 4

Project Design

4.1 System Architecture

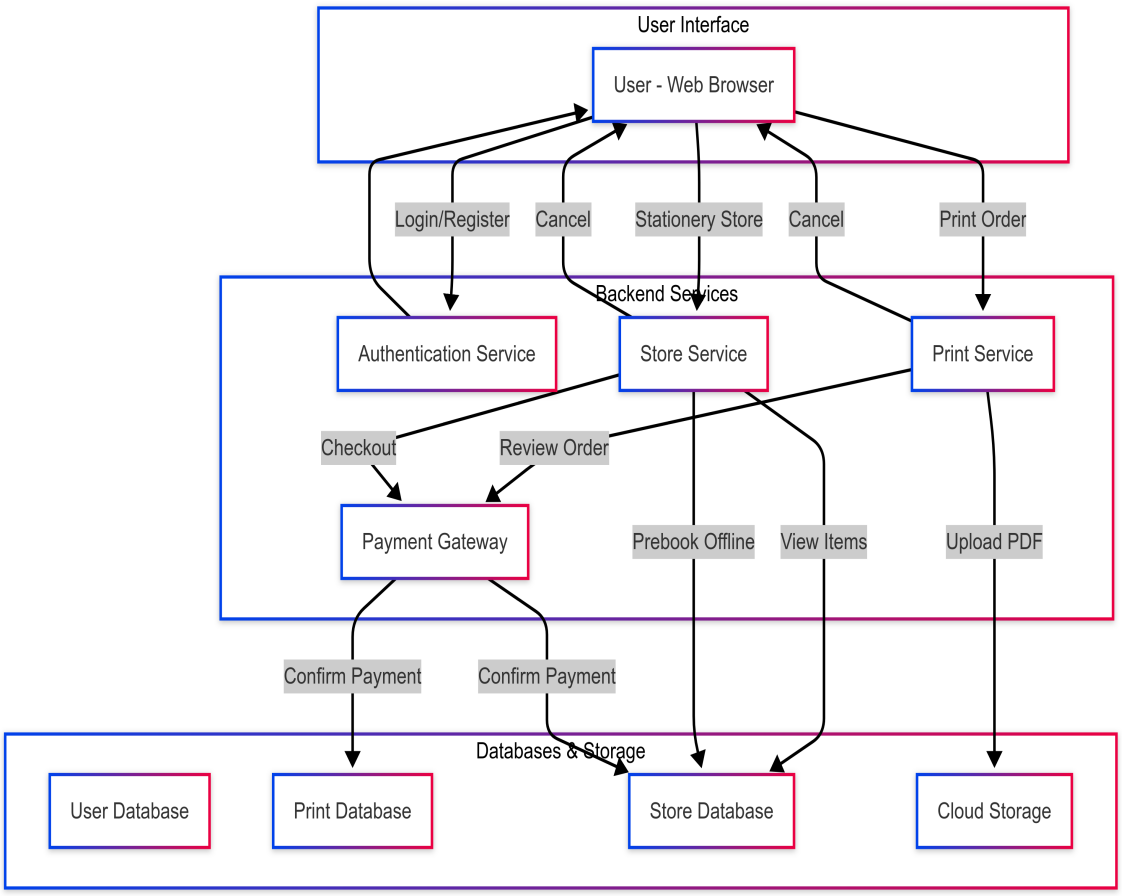

Figure 4.1: Architecture diagram

The mechanism allows students to log in and place print orders by uploading documents and specifying the number of copies required. They can also make online payments through the platform. Once an order is placed, the system queues it for processing, allowing store staff to access and fulfill the requests efficiently. Students can also check the status of their orders in real-time.Additionally, the system provides a stock management feature where store administrators can update product availability in real-time. If an item is out of stock, students are notified, preventing unnecessary store visits. The platform also includes a traffic monitoring system that tracks store congestion, enabling students to check peak hours before planning their visit.The website is built using Flask with Python for the backend, HTML for the frontend, and SQLite for database management. The system automatically updates stock availability, print order status, and traffic information, reducing manual operations and ensuring efficiency.By integrating these functionalities, the system eliminates long queues, reduces waiting times, and optimizes store operations, making the entire process more convenient for students and staff.

4.2 Modules

4.2.1 User Authentication Module

This module handles the user registration and login process. It ensures secure access to the system by allowing students and admins to sign up, log in, and manage their sessions. The login system is designed to authenticate users and grant access based on their roles. The user role management feature differentiates between students and admins, assigning appropriate permissions and functionality. Additionally, the profile management system enables users to update their account details, including personal information and preferences.

4.2.2 Print Order Management Module

This module handles all aspects of print order processing. Users can input details such as the number of pages, whether the print is in color or black and white, and the quantity of prints. The PDF upload system allows users to upload their documents for printing. Once the order is placed, the system calculates the total cost based on the selected options. The print queue management feature tracks the order status and provides an estimated wait time. Users can cancel their orders if needed, and the system will allow them to go back and modify their print specifications. The printer connection feature ensures seamless communication between the system and the printer hardware to process and print the orders.

4.2.3 Stationery Store Module

This module manages the online stationery store, allowing users to browse and manage their purchases. It displays a catalog of available items, with real-time updates on stock levels. Users can add items to their cart for checkout or save them in a wishlist for future reference. The direct buy option enables users to purchase items immediately without needing to add them to their cart. The prebooking system allows students to reserve items for offline payment and later pickup, ensuring availability even when the store is busy. The stock management system ensures accurate tracking of inventory and real-time updates when products are purchased or restocked.

4.2.4 Payment and Order Processing Module

This module handles all payment transactions and order confirmations. The online payment integration supports secure UPI payments for online transactions. For prebooked items, users can pay offline upon pickup. After completing an order, the system sends order confirmations and payment receipts to users, ensuring they have proof of their transactions. The transaction history management feature stores records of all past print and product orders, allowing users to view their purchase history at any time.

Each of these modules integrates with one another, providing a seamless and efficient experience for both students and staff, improving overall convenience and service quality.

4.3 Data Flow Diagrams

4.3.1 Level 0

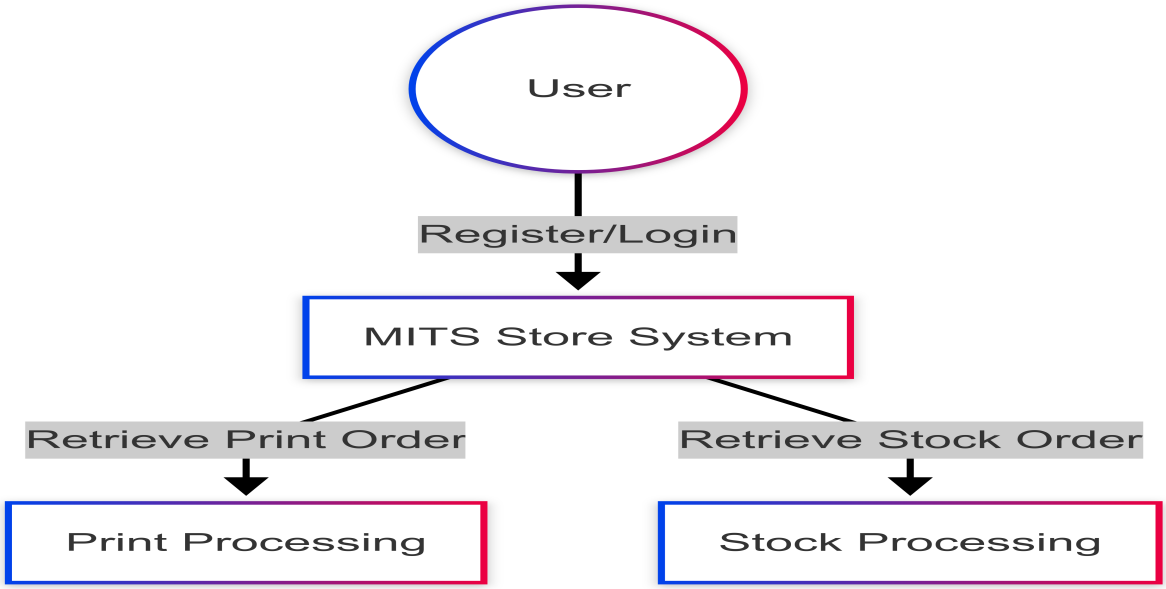

Figure 4.2: Level 0

The user can either register or log in to the MITS Store system. Once logged in, the user can choose to retrieve a print order or a stock order. The input for print orders includes document details, while stock orders involve product selection. The system processes both print and stock orders, providing outputs like order confirmation, status, and updates on stock availability.

4.3.2 Level 1

User has mainly four roles: register or log in with valid credentials, request a print or stock order, retrieve the print or stock order details, and finally logout. If the credentials are invalid, the user is exited from the system. After a successful login, the user can proceed to request either a print order or stock order. For print orders, the user provides document details, which are processed through print processing. For stock orders, the user selects products, and the system processes the order via stock processing. Once the process is complete, the system outputs order confirmations and status updates.There is a direct access between the user module and the database. The database stores user details, order information, and print/stock-related data.

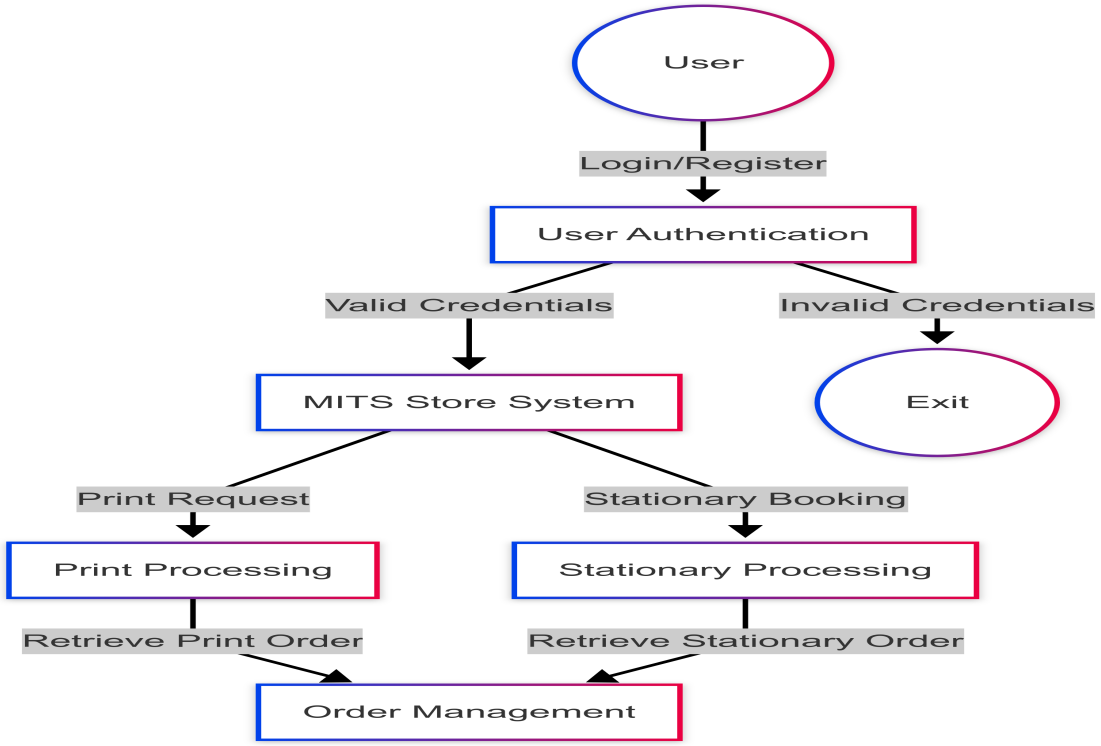

Figure 4.3: level 1

4.3.3 Level 2

When the user logs in with valid credentials, they can either request a print order or a stock order. For a print order, the user provides document details such as the number of copies, color preferences, and uploads the file. The system processes the print order through Print Processing. Similarly, for a stock order, the user can either add items to the cart or prebook offline for future purchase. The system processes the order through Stock Processing, updating the stock in real-time.For stock orders, users have the option to either buy directly from the store or prebook items offline for later payment. Both print and stock orders include an integrated payment option. After the payment is completed, the system generates an order confirmation and updates the user with the order status.The system collects all order-related data, including user details, print specifications, stock availability, and payment information, and stores them in the database. This data is used for order processing and is directly accessible by the user module.

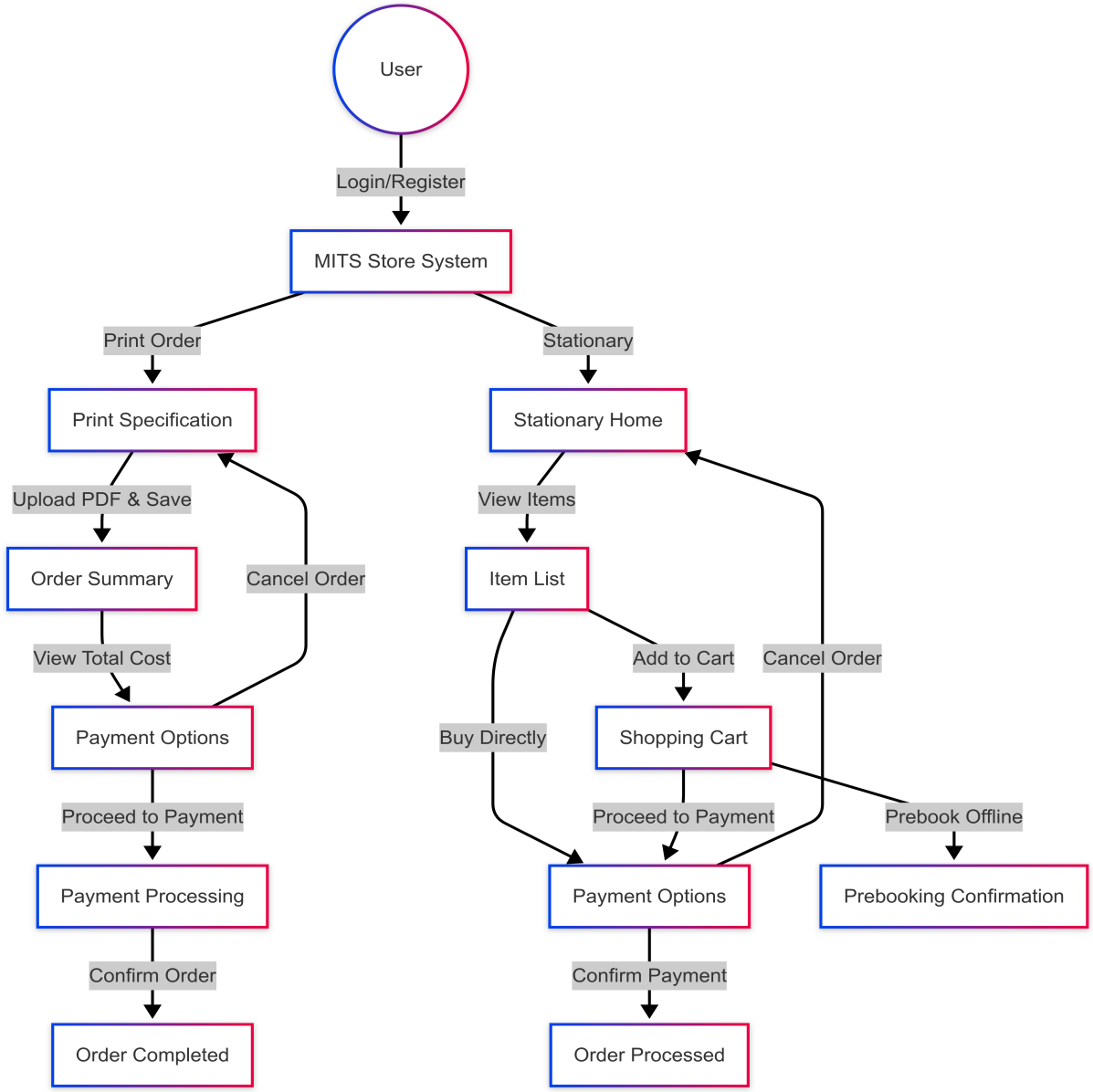

Figure 4.4: Level 2

4.4 System Requirements

4.4.1 Hardware Requirements

Hard Disk: 4 GB

CPU: Quad-core 64-bit ARM clocked at 1.2GHz

GPU: 400 MHz Videocore IV multimedia

4.4.2 Software Requirements

Windows version 7 and above
Technologies used: Python, MATLAB
Database: MongoDB/SQLite
IDE: Visual Studio

Chapter 5

Results and Discussions

Chapter 6

Conclusion

The proposed MITS Store Management System aims to streamline and improve the overall experience for students and staff by automating print and stock orders while addressing issues like crowding and time wastage. Through features like online ordering, real-time stock tracking, and payment processing, the system helps manage the store more efficiently. Students can now place print orders, track their status, and either purchase or prebook stock items directly through the website. The system also eliminates the need for unnecessary trips to the store, saving students valuable time and improving their overall experience.

The integration of payment options ensures smooth transactions, while order confirmation helps in keeping users informed about the status of their purchases. This system will significantly reduce congestion in the store during peak hours, making it easier for students to manage their print and stock needs effectively.

Chapter 7

Future Scope

The main challenge for this system to achieve success is by making people aware of this system and making popular among the civilians of the country as this system is highly dependant on the

Chapter 8

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Chapter 9

Implementation

9.1 Screenshots

9.2 Code Snippets