SCHOOL OF COMPUTER ENGINEERING AND TECHNOLOGY

MAJOR PROJECT REPORT

T.Y. PROJECT
(ACADEMIC YEAR : 2021-2022)
SEMESTER: V

PROJECT TITLE:

ONLINE EXAMINATION PORTAL

Group ID: 17

Name of Project Guide: Mrs. Dipti Ghusse

Project Guide Email and Contact No.: dvchikmurge@comp.maepune.ac.in
+91 9923640812

DETAILS of the Students:

Roll No.	Student Name	Contact Details	Email
57	Tushar Gavkhare	917231039	tpgavkhare@mitaoe.ac.in
59	Tanisha Nazare	9011916680	ttnazare@mitaoe.ac.in
65	Sharwari Ambade	7397958194	sbambade@mitaoe.ac.in
73	Yeeshant Dahikar	8766952314	ysdahikar@mitaoe.ac.in

Abstract

The main aim of this project is to build a portal for online examination conduction. The Online examination lacks many aspects of offline examination. These aspects are descriptive/Subjective, Handwritten, Language, Checking, Cheating free, etc. We as a team sorted each and every aspect and as per discussions and researches formed Objectives related mainly three aspects those are Handwritten, Language, Cheating free. The study for this was done by researching several research papers of IEEE. Thus we created a problem statement to work on with.

Handwriting as well as hand gesture recognition has been one of the active and challenging research areas in the field of image processing and pattern recognition. It has numerous applications which include, reading aid for blind, bank cheques and conversion of any handwritten document into structural text form. The main application in the education sector is regarding examinations. The need of this helps to increase the education level along with different languages (mainly devnagri). This may be done using KNN/Hawk,etc Algorithms.

1. **Project Background / Motivation / Idea Conceptualization**

Project Background

There are various softwares which help the colleges to conduct online exams but each of them only scans the face. Our project aims at zero use of the keyboard, scans the upper body of the user and only hand gestures are identified which makes cheating difficult. OCR has turned out to be very useful for recognition of handwritten data. It is very complicated to achieve the same in the Devanagari script but could be achieved with all the different databases which contain all the types of data like digits, vowels, consonants etc.

We can conduct research on various languages like regional & endangered ones other than English mostly like Devanagri. We will build systems that can recognize on-screen characters and text at a good accuracy level. We will be utilizing OCR to convert scanned image files into digitalised text which is recognized by computers. We will use HCR software to support multiple hand written language recognition and convert them to documents. It will identify diverse human writing styles, angles, shapes and size of letters. We will use advanced technologies to construct a robust and secure system which will support biometric authentication before online exams.

Thus, after several researches and paper findings, the conclusion of the background research concludes the need of Devanagari OCR detection for Examination as well as reducing cheating in Online examination. This background study focuses on reducing teachers checking work so that they will perform more productive teachings.

Motivation:

- Theory exams of Hindi/Marathi are not conducted effectively.
- Children have lost the habit of writing subjective answers.
- Online exams have increased the chances of cheating.
- Increased burden of checking uploaded pdfs.

Idea Conceptualization:
- There are various softwares which help the colleges to conduct online exams but each of them only scans the face.
- Our project aims at zero use of the keyboard, scans the upper body of the user and only hand gestures are identified which makes cheating difficult.
- OCR has turned out to be very useful for recognition of handwritten data.
- It is very complicated to achieve the same in the Devanagari script but could be achieved with all the different databases which contain all the types of data like digits, vowels, consonants etc.

2. Literature Review & Gap Identification

Paper no.	Details	Algorithm used	Dataset	Methodology	Pros	Cons
1	2020 Juhee Sachdeva and Sonu Mittal Handwritten Offline Devanagari Compound Character Recognition Using Machine Learning	Machine Learning algorithms , Backpropagation algorithm, SMO algorithm	handwritten Marathi characters dataset	Database Designing ->Preprocessing -> Feature Extraction Technique -> Classification -> Performance Evaluation Strategies -> Applying Classifiers in WEKA -> Result and Discussion	The present article proposes a model for offline handwritten Devanagari compound character recognition.	Limited size of database
2	2021 Sandhya Anpat1, Sayali Khetri2, Shreejal Dhule3, Dr. J.E. Nalavade4 Handwriting Character Recognition using CNN with GUI	Neural Network(CNN)	The NMIST dataset of hand printed forms and characters which contain 26 folders (A-Z) containing handwritten images in size 28*28, eachalphabetinthe image is centre fitted to 20*20 pixel box. Each image is stored as Grey-level.	Dataset-> Preprocessing-> Traning -> CNN Model-> save & load model -> Prediction -> Output	The results are shown on GUI where it shows the predicted character with position and accuracy of prediction.	accuracy of prediction quite less (90%)
3	2021 Shilpa Mangesh Pande and Bineet Kumar Jha Character Recognition System for Devangari Script Using Machine Learning Approach	Machine Learning (ML) classifiers such as Decision Tree,Nearest Centroid, K Nearest Neighbors ,Extra Trees and Random Forest	Dataset of handwritten character	Database->Isolate individual character in a automated fashion->Preprocessing-Normalization,thinning,noise removal->Feature extraction-->Character recognition using classifier	recognize the characters and found the accuracy of different algorithms in %	Bad handwritten characters were not recognized and accuracy is also less.

Paper No.	Details	Algorithm used	Dataset	Methodology	Pros	Cons
4	2020 Gowtham Senthil, Nandhakumar K, Gorthi Rama Krishna and Sai Subrahmanyam Handwritten Hindi Word Generation to enable Few Instance Learning of Hindi Documents	CNN-RNN hybrid	Hindi Handwritten Characters: CALAM Dataset,Hindi Word Repository: IndoWordnet, Hindi Handwritten Documents: MNIT Dataset, Hindi Handwritten Words: IIITH-HW-Dev Dataset	Dataset->preprocessing->segmentation->Character recognition	The network performs well on words of varying length with different modifiers.	Most of the errors were caused by ambiguities in the original handwritten image whose transcription is challenging even for humans.
5	2021 (arxiv.org) Renshen Wang, Yasuhisa Fujii and Ashok C. Popat Post-OCR Paragraph Recognition by Graph Convolutional Networks	generic paragraph estimation algorithm, the β-skeleton algorithm, Geometric and Rule-based Approaches, bounding box algorithm, heuristic algorithm, Faster R-CNN model	PubLayNet dataset, Web synthetic, Augmented web synthetic	Geometric and Rule-based Approaches -> Page Segmentation -> Graph Neural Network for Table Detection -> Splitting Lines -> Clustering Lines & words -> Data Augmentation -> Experiment -> Dataset Evaluation	F1 scores for heuristic OCR, Geometric and Rule-based Approaches, generic paragraph estimation algorithm	Under splitting, Over splitting, Textline clustering, table clustering, Difficulty to compare with rubrics, Grading needs to be same
6	2021 (elsevier) Yao Huanga ,Jianyu Yanga,** multi-scale descriptor for real time RGB-D hand gesture recognition	pairwise matching algorithm, DTW algorithm, L-M algorithm, linear SVM algorithm, the back propagation neural network (BP)	NTU Dataset, PadovaU Datasets	Hand Detection -> Hand Gesture Description -> Hand Gesture Recognition -> Experiments -> Conclusions	Movement wise Task performance, Hand segmentation, Hand gesture recognition, Dataset comprising of at least 1000 samples	Limited working, Quality image required.

Gap Identification:

OCR detection:
- Distortion of handwritten characters as different people may use different style of handwriting, direction etc.
- Manual feedback for specific undigitalized questions
- Recursive functioning for each question and then final result

AI based examination:
- Error in detection or no task assigned for specific sign
- Movement recognition can't be through single image
- If task completed then no need of retake

3. Aim & Problem Statement

Aim:

To create an Online examination Portal.

Problem Statement:

Online examination Portal using Automated sign recognition and Devanagiri handwritten checking using OCR.

4. Objective & Scope

Objectives:

- Build a platform which will contain both the features: Online examination and handwritten devanagari paper checking.
- Online examination: Online examination using sign recognition in order to decrease cheating and increase performance (next question, previous question, MCQ selection, etc.)
- Handwritten devanagari paper checking: Devanagari handwritten character recognition for paper checking using OCR.

Scope:

- Educational sector may get connected more with AIML.
- Automation in examination leads to speed in development.
- Due to automation literacy rate increases.
- Online Examination including Handwritten papers supports Teaching spirit.

5. Deliverables:

Sr.no.	Sectors	Impact
1.	Schools	There are many different regional languages that are taught by teachers and question papers organised in their own languages. But when it comes to checking the papers,the teacher has to check manually. We are considering 2 languages that are Marathi and Hindi in our project to check the papers so it will save much time.
2.	Coaching centers	Many coaching centers take the entrance exams to check the ability of students. If a student clears cutoff marks then students get a chance to learn in the coaching center. So our project will be the best platform that will catch a student who will cheat in the exam.
3.	Companies	Many companies take the aptitude test round which is based on the mcqs for checking solving ability. Our platform will help the companies to choose correct candidates who will apply for jobs.
4.	Students	As we go through the corona pandemic, we get to know that learning can be possible in both forms (online and offline). Students can give online examinations with the help of our platform and can get their marks after examination..
5.	Teachers	For teachers, our platform provides the feature such that they can create their own MCQ based exams and there is no need to check handwritten copies of students.

6. Methodology, System Requirements, Expected Outcomes & Timeline

Methodology:

Module1: OCR detection
PDF uploading
PDF to text conversion
Answer key Comparison

Module2: Hand recognition
Image Uploading
Hand recognition
Task assigning

Module3: API creation i.e. deployment
API creation
API deploying as backend
API connection to WEB

Module4: Website deployment Online Examination Portal
WEB Portal Frontend
Connection with backend
Final uploading Herokuapp

System Requirements:

Libraries : 1) ocrmypdf
        2) pdfplumber
        3) numpy
        4) pandas

Google colab/ Jupyter
Python Programming

IONIC (Html, CSS, Typescript)
Firebase database
Herokuapp/AWS
Vs Code platform
Github

API Services
AWS/Heroku API deployment

Expected Outcomes:
- To conduct online exams.
- To reduce cheating by increasing automation.
- To check Marathi/Hindi Examinations
- Grading of MCQ exams as well as Uploaded Handwritten papers

High-Level Timeline/Schedule

Main MODULE	PART	CRUX	Timing
Module1: OCR detection	1- PDF uploading	Colab/Jupyter upload, PDF paging, Aligning, Segmentation, Database collection	Week 1
	2- PDF to text conversion	Segment to paragraph, paragraph to line, line to word, word to character recognition	Week 2
	3- Answer key Comparison	Uploading answer key, Answer key conversion, Answer set creation, Rubrics, Grading	Week 4
Module2: Hand recognition	1- Image Uploading	Image sequence, Arrangement, Filtering, Clustering	Week 6
	2- Hand recognition	Segmentation, Hand recognition, Sign recognition, Movement recognition(Img_seq), Collection of database	Week 8
	3- Task assigning	Task creation, Task selection, Task completion, Grading	Week 12

Module3: API creation i.e. deployment	1- API creation	Backend program uploading(AWS/GCP), Cloud performance	Week 14
	2- API deploying as backend	Backend testing	Week 15
	3- API connection to WEB	Backend implementation locally	Week 16
Module4: Website deployment Online Examination Portal	1- WEB Portal Frontend	HTML, CSS, Complete front-end creation	Week 18
	2- Connection with backend	Web to firebase connection, OCR detection connection, Hand recognition connection, Grading(if possible)	Week 20
	3- Final uploading Herokuapp	Deployment to Herokuapp/AWS/GCP	Week 21

7. Initial Design

UML Diagrams:

USER CASE DIAGRAM

ACTIVITY DIAGRAM
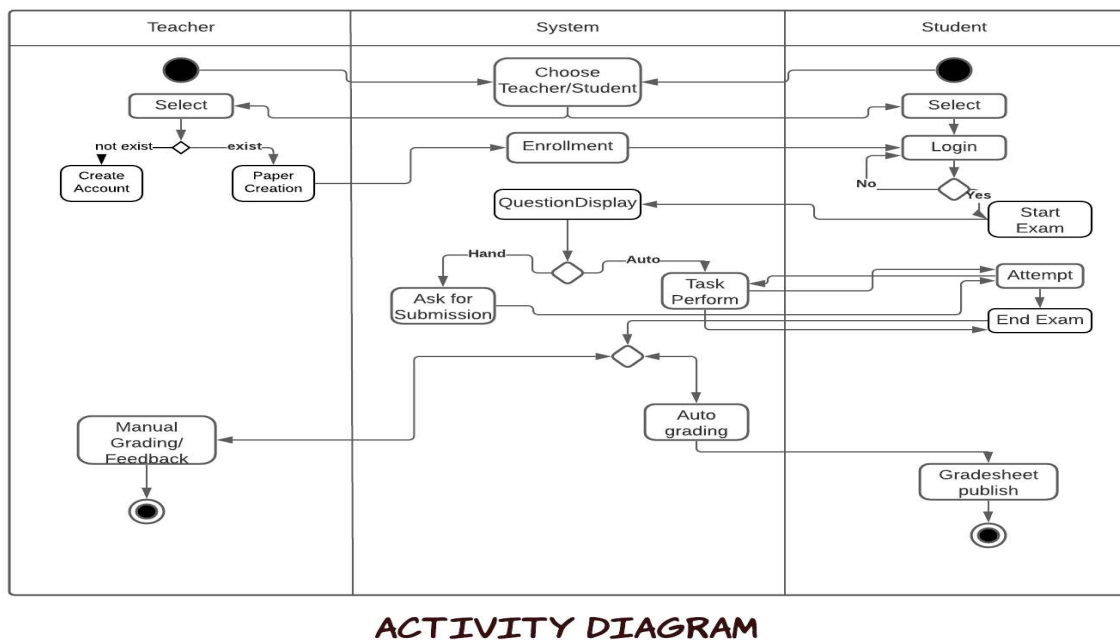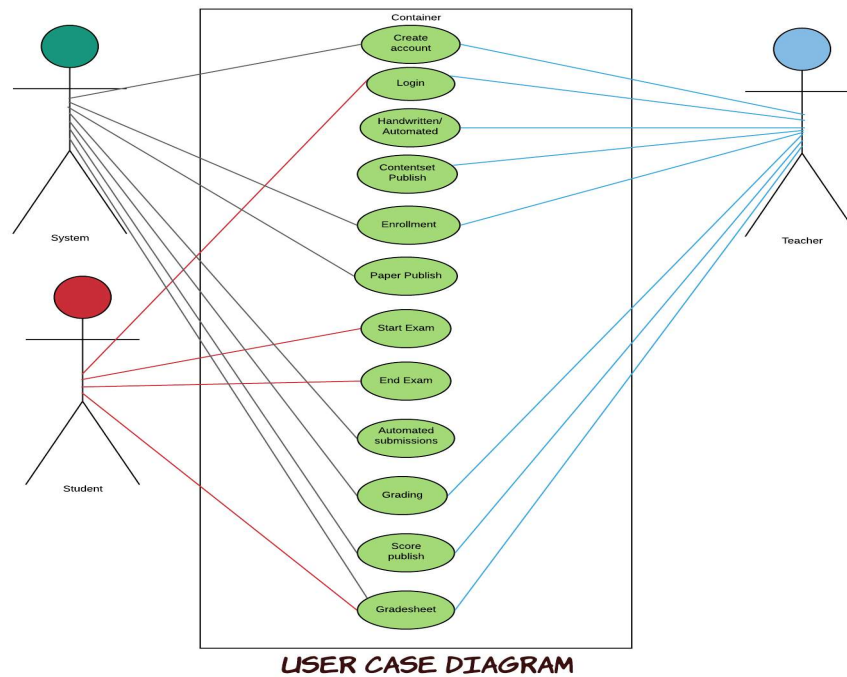
8. Implementation

DATASETS:
1. Devanagiri dataset:
   https://archive.ics.uci.edu/ml/datasets/Devanagari+Handwritten+Character+Dataset
2. Signs dataset:
   Mendeley Data - HGM-4

Algorithm:
1. K means Algorithm
2. KNN Algorithm
3. Hawks Algorithm
4. OCR detection
5. Geometric paragraph Recognition Algorithm

9. Conclusion

This project contains the features that are lacking in online examination. All the objectives were achieved. As of now, after performing literature survey it is clear that we can use different algorithms like OCR, CNN to complete this project. We also found various databases such as Handwritten database, Database of devanagari digits, vowels, consonants etc.