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Hand Written Text Recognition And Conversion To Editable Text

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ABSTRACT

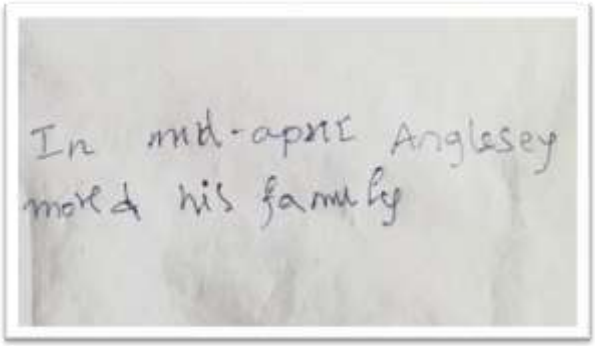
A significant area of research is creating an interface for character recognition that can read text from a picture. Information from handwritten papers is increasingly being stored for use in the future. Picture capture of the handwritten paper and saving it in image format is an easy technique to save the data. "Optical Character Recognition" is the process used to convert handwritten data into electronic representation. Pre-processing, segmentation, feature extraction, and postprocessing are some of the procedures involved. OCR has been utilised by several academics to identify characters. This technique use an Android phone to take a picture of the document, then OCR completes the remaining processes. Recognizing the characters in various handwriting styles is the key issue. As a result, a system is created that can read handwritten data and produce editable text. This system's output is based on the data that the writer must input. Our solution provides the simplest method to update or distribute the identified data and achieves 90% accuracy for handwritten papers.

Keywords: : OCR, handwritten text recognition.

1. INTRODUCTION

Despite the abundance of technological writing tools, many people still choose to take their notes traditionally: with pen and paper. However, there are drawbacks to handwriting text. It's difficult to store and access physical documents in an efficient manner, search through them efficiently and to share them with others. Thus, a lot of important knowledge gets lost or does not get reviewed because of the fact that documents never get transferred to digital format. We have thus decided to tackle this problem in our project because we believe the significantly greater ease of management of digital text compared to written text will help people more effectively access, search, share, and analyze their records, while still allowing them to use their preferred writing method. The aim of this project is to further explore the task of classifying handwritten text and to convert handwritten text into the digital format. Handwritten text is a very general term, and we wanted to narrow down the scope of the project by specifying the meaning of handwritten text for our purposes. In this project, we took on the challenge of classifying the image of any handwritten word, which might be of the form of cursive or block writing. This project can be combined with algorithms that segment the word images in a given line image, which can in turn be combined with algorithms that segment the line images in a given image of a whole handwritten page. With these added layers, our project can take the form of a deliverable that would be used by an end user, and would be a fully functional model that would help the user solve the problem of converting handwritten documents into digital format, by prompting the user to take a picture of a page of notes. Note that even though there needs to be some added layers on top of our model to create a fully functional deliverable for an end user, we believe that the most interesting and challenging part of this problem is the classification part, which is why we decided to tackle that instead of segmentation of lines into words, documents into lines. Image processing could

be a manipulation of images within the computer vision. With the event of technology, there are many techniques for the manipulation of the photographs. The text recognition includes a huge role in many areas. But it's difficult to try and do such a task by a machine. For recognition, we've to coach the system to acknowledge the text. The character recognition involves several steps like acquisition, feature extraction, classification, and recognition. Handwriting recognition is the ability of a machine to receive and interpret the handwritten input from an external source like image. the most aim of this project is to style a system that may efficiently recognize. Machine Learning needs early Feature Extraction as features and performed classification on it. But Deep Learning acts as a "black box" which do feature extraction and classification on its own. But deep learning extracts feature and perform classification on its own. Example of this given image to the Convolutional Neural Networks that every layer of CNN takes the feature and finally Fully Connected Layer perform classification. The main conclusion is Deep Learning self extracts features with deep neural networks and classifies itself. Compare to traditional Algorithms its performance increase with the Amount of Data.



Hand Written Text

Editable text

Fig 1.a Conversion of Hand Written text to Editable Text

1.1 problem statement: The problem statement " Hand written text recognition and conversion to normal editable text ". The problem statement states that if the input image is of different handwriting where all the people cannot understand. so we implement an OCR model using deep learning

techniques for identifying words and characters. And then we are converting it into normal editable text to help the users understand and identify easily. In addition to this we are converting into two languages.

2. LITERATURE SURVEY

2.1 Elie Krevat, Elliot Cuzzillo. Improving Off-line Handwritten Character Recognition with Hidden Markov Models.

A method for the off-line recognition of handwritten characters with hidden Markov models is described. when applying the Viterbi algorithm to return the most likely character sequence. Finally, our HMM algorithms are compared to a dictionary creation and lookupalgorithm that is less generally applicable but for our particular dataset achieves almost perfect classification results.

Pros : By considering all inner word transitions by applying the algorithms.
Conversion of text is more accurate than the already scribble in it.

Cons : Ignoring the inner word transitions.
Less generally applicable for our particular data set.

2.2 Fabian Tschopp. Efficient Convolutional Neural Networks for Pixelwise Classification on Heterogeneous Hardware Systems.

With recent advances in high-throughput Electron Microscopy (EM) imaging it is now possible to image an entire nervous system of organisms like Drosophila melanogaster. One of the bottlenecks to reconstruct a connectome from these large volumes (oe 100 TiB) is the pixel-wise prediction of membranes. The time it would typically take to process such a volume using a convolutional neural network (CNN) with a sliding window approach is in the order of years on a current GPU. With sliding windows, however, a lot of redundant computations are carried out. In this paper, we present an extension to the Caffe library to increase throughput by predicting many pixels at once. On a sliding window network successfully used for membrane classification, we show that our method achieves a speedup of up to 57×, maintaining identical prediction results.

Pros : The quality is predicted in two neural data sets (Segment Anisotropic, Neural Tissue).
Sliding window networks classifies an image by taking the pixel.

Cons : It is difficult to classify single pixel in patches of a whole image.
The classical convolution neural network might not be more useful.

2.3 H. Bunke1, M. Roth1, E.G. Schukat -Talamazzini. Offline Cursive Handwriting Recognition using Hidden Markov Models.

A method for the off-line recognition of cursive handwriting based on Hidden Markov Models (HMMs) is described. The features used in the HMMs are based on the arcs of skeleton graphs of the words to be recognized. An average correct recognition rate of over 98% on the word level has been achieved in experiments with cooperative writers using two dictionaries of 150 words each. CR categories and Subject Description: I.5: Pattern Recognition; I.4: Image Processing General Terms:

Pros : A method for cursive hand writing is introduced named hidden markove models (HMM).
The arcs of skeleton graphs of the words can be recognized.

Cons : OCR distinguishes between the recognition of isolated characters and cursive scripts.
All the people cannot understand cursive hand writing.

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3. PROPOSED SYSTEM

To overcome the problem with an existing system, we are implementing the OCR methodology here to convert the handwritten text into editable text. Here the user can upload the handwritten text image, it will convert into string format and then it will write that string into text by using OCR technique. After converting into editable text we will convert them into two languages.

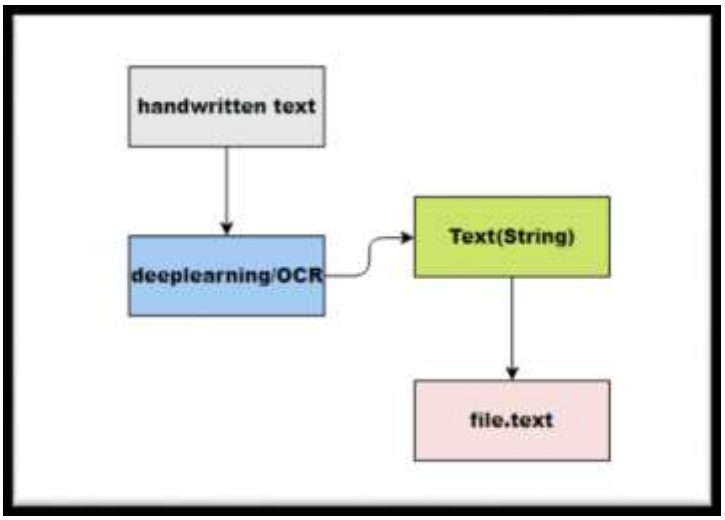

Fig. 1: Block diagram of proposed system.

3.1 Advantages

- Good accuracy
- Time saving
- Having in built scanners.

3.2. Methodology

♣ Operating System : Windows 7+

♣ Server – Side Script : Python 3.6+

♣ IDE : PyCharm

♣ Frame Work : Flask

♣ Libraries Used : Pandas, Numpy, Os, Keras

Flask :

Flask is a web framework, it's a Python module that lets you develop web applications easily. It has a small and easy-to-extend core: it's a microframework that doesn't include an ORM (Object Relational

Manager) or such features. It does have many cool features like URL routing, template engine. It is a WSGI web app framework. Flask is a web application framework written in Python. It was developed by Armin Ronacher, who led a team of international Python enthusiasts called Poocco. Flask is based on the Werkzeg WSGI toolkit and the Jinja2 template engine. Both are Pocco projects.

MySQL :

It is the most popular Open Source Relational SQL database management system. MySQL is one of the best RDBMS being used for developing web-based software applications. It is an open source.open source means that you are free to use and modify it.anybody can install the software.you can also learn and optimize the source code to better accommodate your needs.However, the GPL(GNU public lisence) determines what you can do depending on the conditions.The commercially licensed is available if u need more flexible ownership and advanced support.

Pandas :

Pandas is an open-source library that is made mainly for working with relational or labeled data both easily and intuitively. It provides various data structures and operations for manipulating numerical data and time series. This library is built on top of the NumPy library. Pandas is fast and it has high performance & productivity for users.

Numpy :

NumPy, which stands for Numerical Python, is a library consisting of multidimensional array objects and a collection of routines for processing those arrays.
Using NumPy, mathematical and logical operations on arrays can be performed.
Numpy is a general-purpose array-processing package.It provides a high-performance multidimensional array object,and tools for working with these arrays.It is the fundamental package for scientific computing with python. Besides its obvious scientific uses,Numpy can also be used as an efficient multi-dimensional container of generic data.

Keras :

Keras is a high-level neural networks API, capable of running on top of Tensorflow, Theano, and CNTK. It enables fast experimentation through a high level, user-friendly, modular and extensible API. Keras can also be run on both CPU and GPU. Keras was developed and is maintained by Francois Chollet and is part of the Tensorflow core, which makes it Tensorflows preferred high-level API.

4. RESULTS AND DISCUSSION

TEST CASE1: UNIT TESTING

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Features to be tested: Verify that the entries are of the correct format.
Verify that the entries are of the correct format.

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TESTCASE 2:

INTEGRATION TESTING

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.
The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

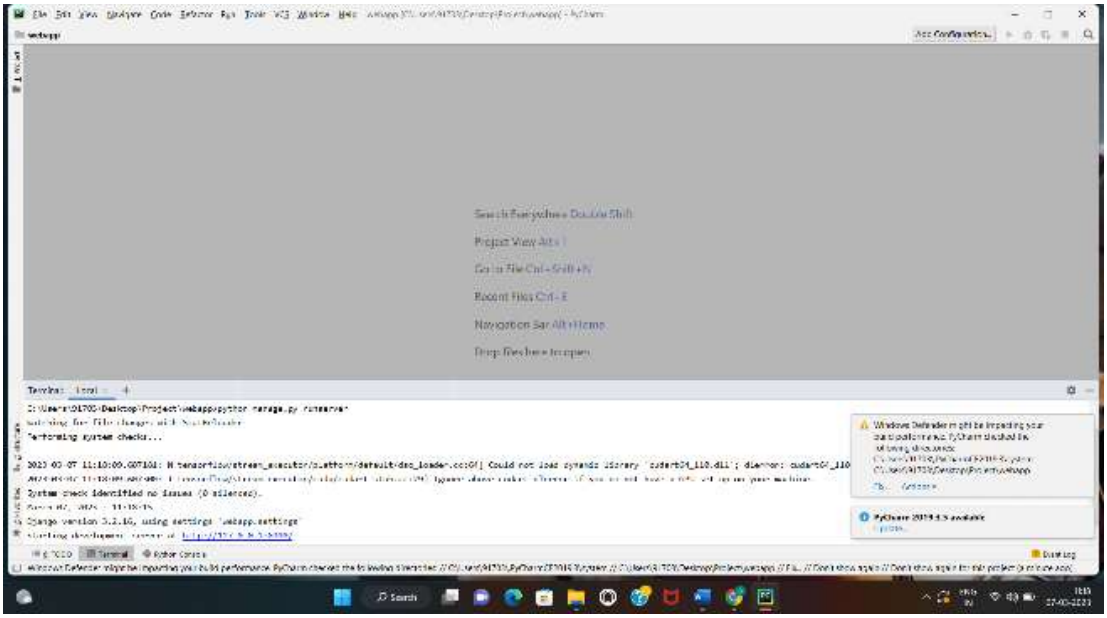
TESTCASE 3: ACCEPTANCE TESTING

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

TESTCASE 4:

USER INTERFACE TESTING

User interface testing is a technique used to identify the presence of defects is a software under test by using graphical user interface.The primary aspects of user interface testing are functionality,performance,usability.



RESULT:

By executing the code in pycharm and entering command "python manage.py runserver" a link will be generated.by clicking the generated link we will be redirected to the interface.

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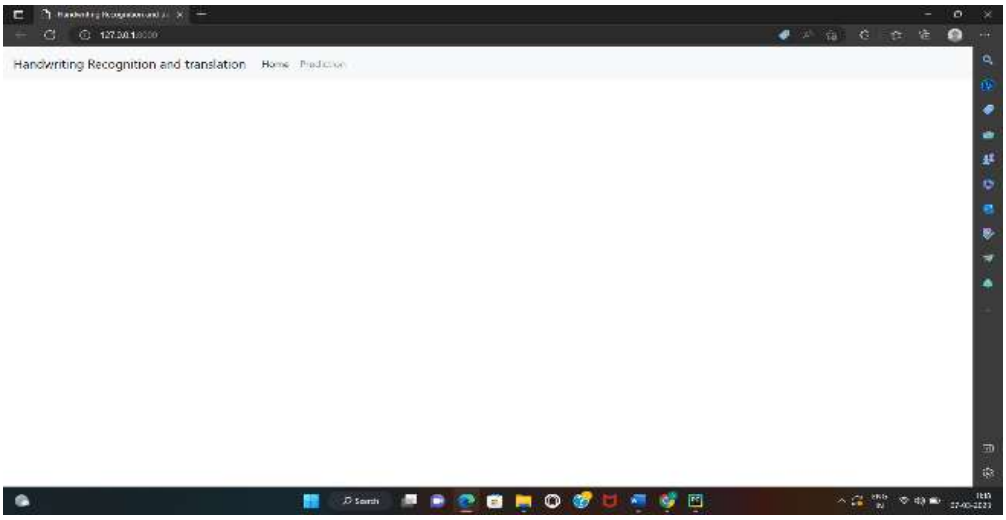

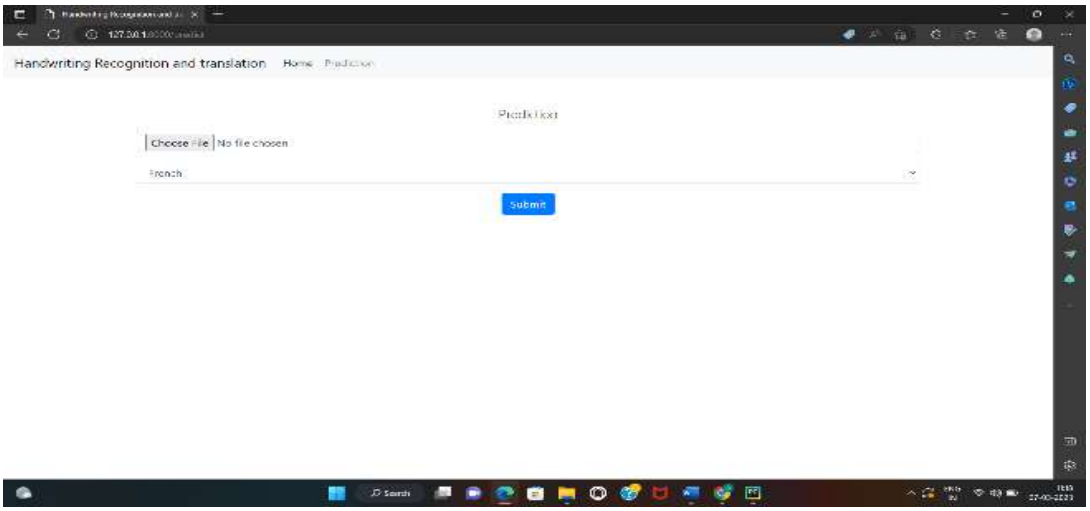

The initial page for any user will be displayed as follows by clicking the link.

After redirected to the interface we will get two buttons named as home and prediction.

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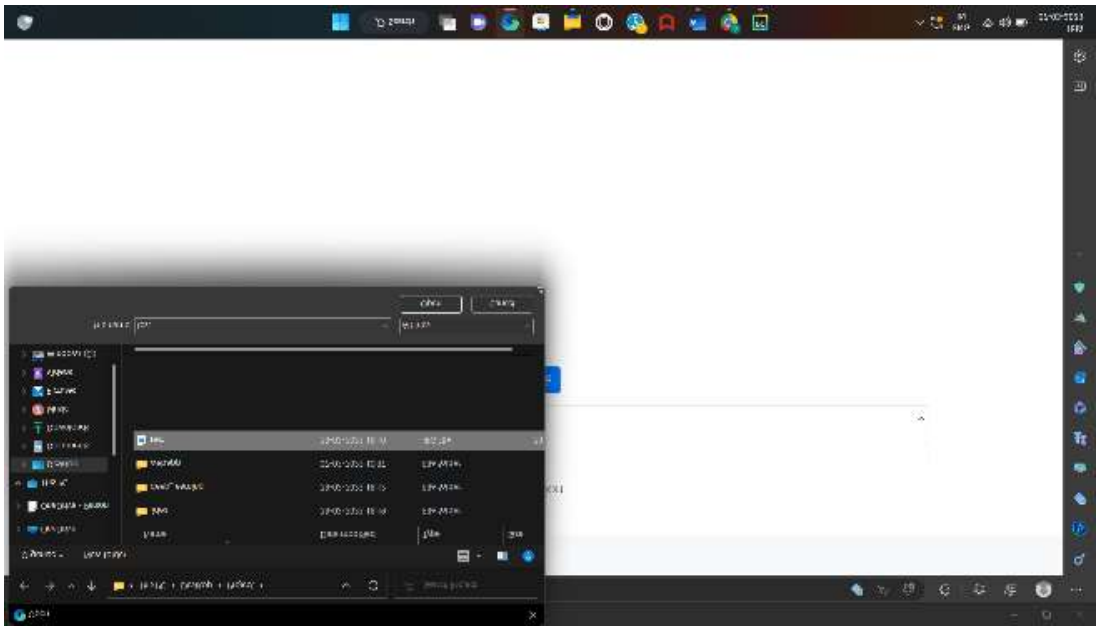
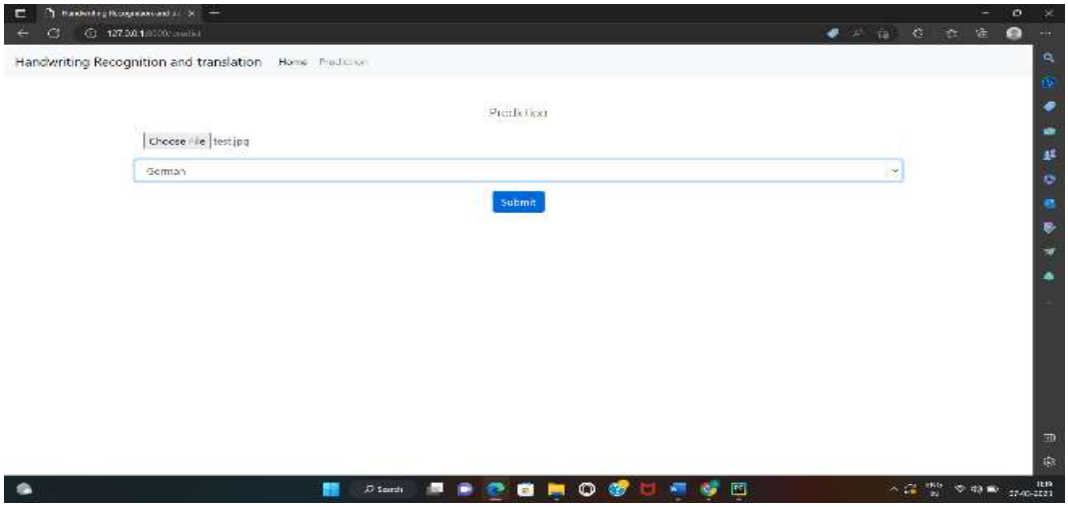
By clicking the prediction button we will be redirected to the page. we need to choose a file by clicking the choose file button.





After choosing the file button we need to choose JPEG file format specified by the user.

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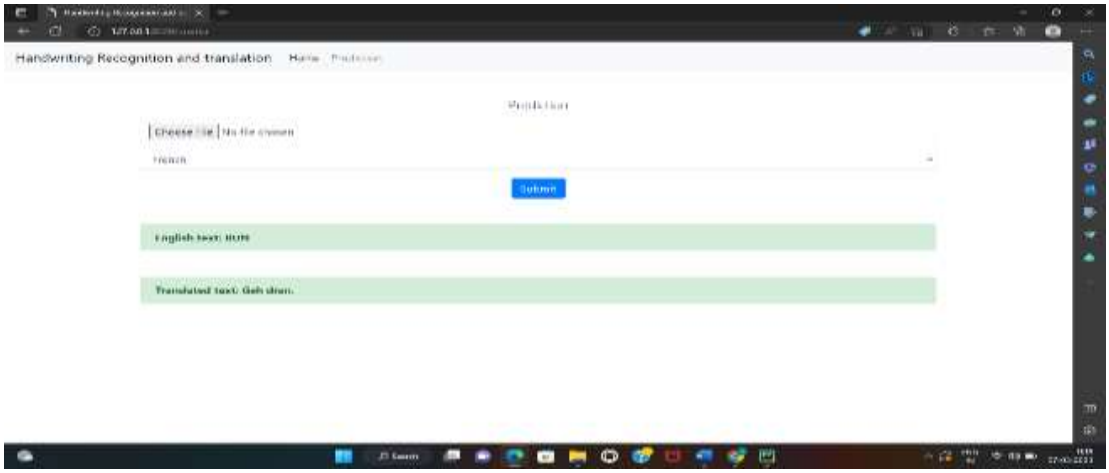
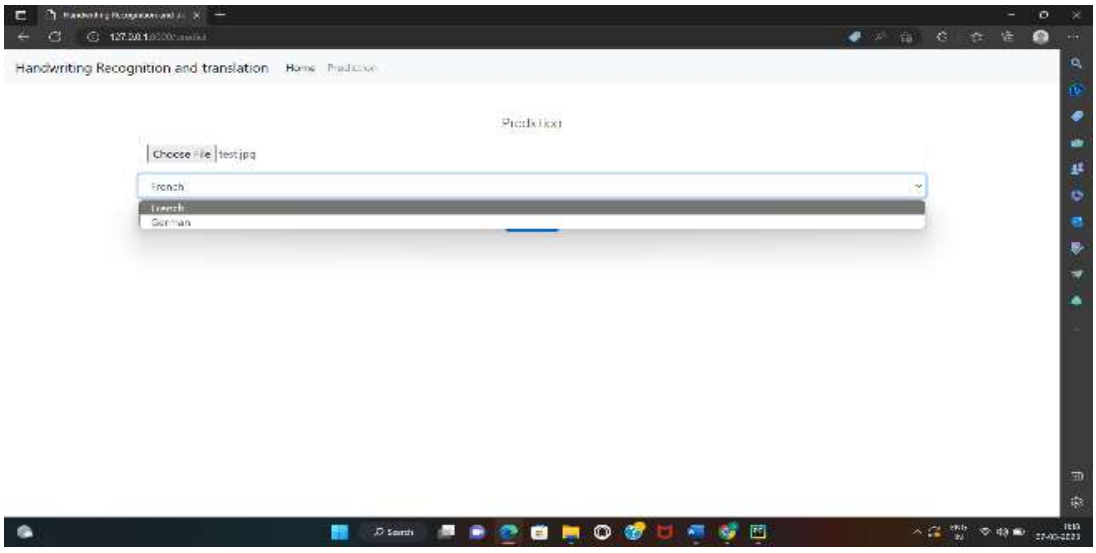
After choosing the file we need to select the language in which language the chosen file need to be converted in the form of digital text.





After selecting the file and the language we need to "submit".

Here the final output will be displayed in the digital format specified user language.

6. CONCLUSION

In this project we have proposed a deep learning architecture with training character images and testing made on different characters and that correctly classifies our test images. The number of approaches used was stopped at particular number because we had received a cut point after which the accuracy was not improving and the loss was not decreasing on both training and validation data.

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