"Optical Character Recognition"

A Dissertation submitted in partial fulfillment of the requirement
for the award of degree of

MASTER OF COMPUTER APPLICATIONS
of
Visvesvaraya Technological University, Belagavi

By

Dinakar N
1RN19MCA16

Carried out at
NASTECH

Under the Guidance of

Internal guide:
Dr. Rajani Narayan
Associate Professor
Dept. of MCA

External Guide:
Mr. Azib Hasan
Subject matter expert
NASTECH

ESTD:2001
An Institute with a Difference

Department of Master of Computer Applications
RNS Institute of Technology
Dr. Vishnuvardhan Road, Channasandra, Bengaluru-560 098
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CERTIFICATE

This is to certify that ***Mr. Dinakar N*** *, student of 6th semester MCA, bearing the USN:* ***1RN19MCA16*** *has completed his final semester internship/project work entitled* ***"Optical Character Recognition"*** *as a partial fulfillment for the award of Master of Computer Applications degree, during the academic year 2022 under our joint supervision.*

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DECLARATION

I, **Mr. Dinakar N**, student of 6th MCA, RNS Institute of Technology, bearing USN: **1RN19MCA16** hereby declare that the project entitled **" Optical Character Recognition"** has been carried out by me under the supervision of External Guide **Mr. Azib Hasan**, Subject matter expert, and Internal Guide **Dr. Rajani Narayan**, Associate Professor and submitted in partial fulfillment of the requirements for the award of the Degree of Master of Computer Applications by the Visvesvaraya Technological University during the academic year 2022. This report has not been submitted to any other Organization / University for any award of degree or Certificate.

Signature
(Dinakar N)

ACKNOWLEDGEMENT

The successful completion of any task would be incomplete without the mention of the people who made it possible, whose constant support and encouragement has crowned my efforts.

I take this opportunity to acknowledge the guidance I have received from different individuals and place on record my appreciation and thanks.

I express my sincere gratitude to **Dr. R N Shetty**, Founder and **Sri**. **Satish R Shetty**, Managing Director, RNSIT for providing us wonderful academic environment.

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I am grateful to **Dr. N P Kavya**, Head of the Department of MCA, RNSIT for nurturing our technical skills and contributing towards the success of this project.

I would also express my heartfelt thanks to my internal guide **Dr. Rajani Narayan**, Associate Professor, Department of MCA, RNSIT for her continuous guidance and valuable suggestions for this internship work.

It's my pleasure to thank **NASTECH** for providing me the best platform to complete the internship work and glad to thank the external guide **Mr. Azib Hasan**, Subject matter expert.

I also express my heartfelt thanks to all the teaching and non-teaching staff members of MCA Department for their encouragement and support throughout this work.

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ABSTRACT

The project is about Optical Character Recognition. It is a process of classifying optical patterns with respect to alphanumeric or other characters. Optical character recognition process includes segmentation, feature extraction and classification.

OCR analysis takes the input as digital image which is printed or hand written and converts it to machine readable digital text format. Then OCR processes the digital image into small components for analysis of finding text or word or character blocks. And again, the character blocks are further broken into components and are compared with dictionary of characters.

python is a programming language it will provide an environment where this problem can be solved. It has a huge library we can import the library for performing OCR task. A use of python includes analysis, algorithm development, computation and much more It helps us to solve our problem in no time and provides an easy solution.

The OCR text is written into a pure text file that is then imported again to a search engine. The text is used as index searching of the information. Accuracy rates are measured in several ways and the ways they are measured impact the accuracy rate.

TABLE OF CONTENTS

	Page No.
DECLARATION	**i**
ACKNOWLEDGEMENT	**ii**
ABSTRACT	**iii**
TABLE OF CONTENTS	**iv**
LIST OF FIGURES	**v**
LIST OF TABLES	**v**

1.	**INTRODUCTION**	**1**
	1.1. Aim	**-**
	1.2. Project description	**-**
	1.3. Scope	**-**
2.	**COMPANY PROFILE**	**3**
	2.1. Organization structure	**-**
	2.2. Different departments and functions	**-**
	2.3. Job process / Services / Facilities	**-**
3.	**TOOLS AND TECHNOLOGY**	**5**
	3.1. Tools/technology used by company	**-**
	3.2. Tools learned in training	**-**
4.	**INTERNSHIP WORK**	**7**
	4.1. Task assigned	**-**
	4.2. Application developed using modern tools	**-**
	4.3. Professional learning (Discipline, attitude, planning, groupwork, self-assessment, etc)	**-**
5.	**IMPLEMENTATION**	**8**
	5.1. Screen shots	**-**
6.	**SOFTWARE TESTING**	**10**
	6.1. Sorts of investigations / Test cases	**-**
7.	**CONCLUSION AND FUTURE WORK**	**11**
REFERENCES		

List of Figures

Figure No.	Figure Caption	Page No.
5.1	Main screen	8
5.2	Uploaded image screen	8
5.3	Result screen	9

List of Tables

Table No.	Table Caption	Page No.
6.1	Test Cases	10

Chapter – 1

INTRODUCTION

1.1 Aim

To develop an OCR application for the recognition of characters in the image files by machine. In first stage of text capture or scanned image of a page is taken. And this scanned copy will form basis for all other stages. The very next stage involves implementation of technology Optical Character Recognition for converting text content into machine understandable or readable format.

1.2 Project Description

In this project I'm going implement the application which will recognize the characters and digits from the image file. From that image file this application will convert that into the texts which the user can copy and he can use that text.

Here I developed OCR which will recognize the English character. OCR is an Optical Character Recognition and is the mechanical or electronic translation of images of handwritten or typewritten text (usually captured and scanned image) into machine-editable text. OCR is a field of research in pattern recognition, artificial intelligence and machine learning and machine vision.

This application recognizes only the English alphabets and digits which is present in the image file. This application is created using the Streamlit. Which is an open-source python framework for building web apps for Machine learning and Data science.

To achieve this project tesseract is used. Python-tesseract is a tool for python in which it will recognize and read the text embedded in images.

It is also useful as a standalone innovation script to tesseract, as it can read all images type supported including jpeg, jpg and png and others.

1.3 Scope

This application is a platform where the user has the option to upload their required image file to get the characters of that image as text. The recognized characters can be used for any other document purpose of users.

The accuracy of the characters is greater when there is properly separated characters is present and there should be constant distance between the characters and rows. The images should be given to this application in the format of jpg, jpeg and png.

Chapter - 2

COMPANY PROFILE

2.1 Organization Structure

NASTECH (New Age Solutions Technologies) is formed with the purpose of bridging the gap between Academia and Industry.

Nastech is one of the leading Global Certification and Training service providers for technical and management programs for educational institutions. We collaborate with educational institutes to understand their requirements and form a strategy in consultation with all stakeholders to fulfill those by skilling, reskilling and upskilling the students and faculties on new age skills and technologies.

2.2 Different department and functions

They offer industry and project-oriented training programs which not only expose students to hands-on training experience but also make them practical oriented towards the industry-readiness expected in today's time.

They take pride that all their programs are mapped to a certain Global Certification Exams i.e. after the students are done with their training, they will prove themselves on a global level via a global certification exam.

They lead from the front in terms of costing of our overall global certification and training programs. They provide placement training for pre-final and final year students and they conduct LMS and Online assessment solutions for future ready campuses.

2.3 Job process / Services / Facilities

NASTECH has taken pledge to skill maximum students pan India on the new age skills to make them industry ready. We are scaling this through our Global Certification Programs which are mapped to different departments of universities/colleges. Depending on the interest and capabilities, participants can choose the program and get trained with best of the trainers and peers.

They execute different technical programs as per the interest of students and requirement of colleges.

Course Names:

1. IOT with AWS Cloud (Online)
2. Cloud Computing using Azure
3. Cloud Security
4. Python Programming with advance concepts
5. Business Analytics
6. Power BI (Business Intelligence)
7. Advance Excel
8. Digital Marketing and many more.

Certification programs mapped to Global Certification Exams from Microsoft/EC- Council/Google/AWS/ Adobe).

Chapter – 3

TOOLS AND TECHNOLOGY

3.1 Tools / Technology used in company

3.1.1 AI and ML

Machine learning and artificial intelligence (AI/ML) are two advanced technologies with the power to transform the way business operate and humans interact.

AI/ML are already impacting industries like IT, healthcare, education and transportation.

Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision.

Machine learning (ML) is a type of artificial intelligence (AI) that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values.

3.2 Tools learned in training

3.2.1 Python

Python is extensible and portable language. Python can be used to perform cross languages tasks. The adaptability of Python makes it easy for data scientists and developers to train machine learning models. Fast code tests: Python provides a lot of code review and test tools.

3.2.2 Colab

Colaboratory, or “Colab” for short, is a product from Google Research. Colab allows anybody to write and execute arbitrary python code through the browser, and is especially well suited to machine learning, data analysis and education. More technically, Colab is a hosted Jupyter notebook service that requires no setup to use, while providing access free of charge to computing resources including GPUs.

3.2.3 Kaggle

Kaggle allows users to find and publish data sets, explore and build models in a web-based data-science environment, work with other data scientists and machine learning engineers, and enter competitions to solve data science challenges.

3.2.4 Github

GitHub is a code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere. This tutorial teaches you GitHub essentials like repositories, branches, commits, and pull requests.

3.2.5 Azure

Azure is a cloud computing platform and an online portal that allows you to access and manage cloud services and resources provided by Microsoft. These services and resources include storing your data and transforming it, depending on your requirements.

Chapter – 4

INTERNSHIP WORK

4.1 Task Assigned

In training they have though us about different tools in AI and ML. Firstly they have thought us about the basics of python in google colab .

In hands on experience, they have thought us to take datasets from different platforms and apply different libraries in python like numpy, matplotlib, pandas etc.

By using this we have to develop an application as project.

4.2 Application developed using modern tools

The applications developed using modern tools during internship training are:

1. Sentiment analysis Twitter
2. Book recommendation
3. Spam Ham
4. Face and eye detection
5. Computer vision

4.3 Professional learning (Discipline, attitude, planning, groupwork, self-assessment, etc)

In Internship training they have discussed about the AI and ML technology. Using google colab, we have used different libraries to get required solution.

To achieve this project, I have used streamlit open-source python framework to host the web app of machine learning.

In training they have given the assessment through quiz, to know about learned skills in training process by company.

Chapter – 5

IMPLEMENTATION

5.1 Screenshots

The figure 5.1 provides main screen of OCR to upload image.

Figure 5.1 Main screen

The figure 5.2 displays the screen after uploading the image.

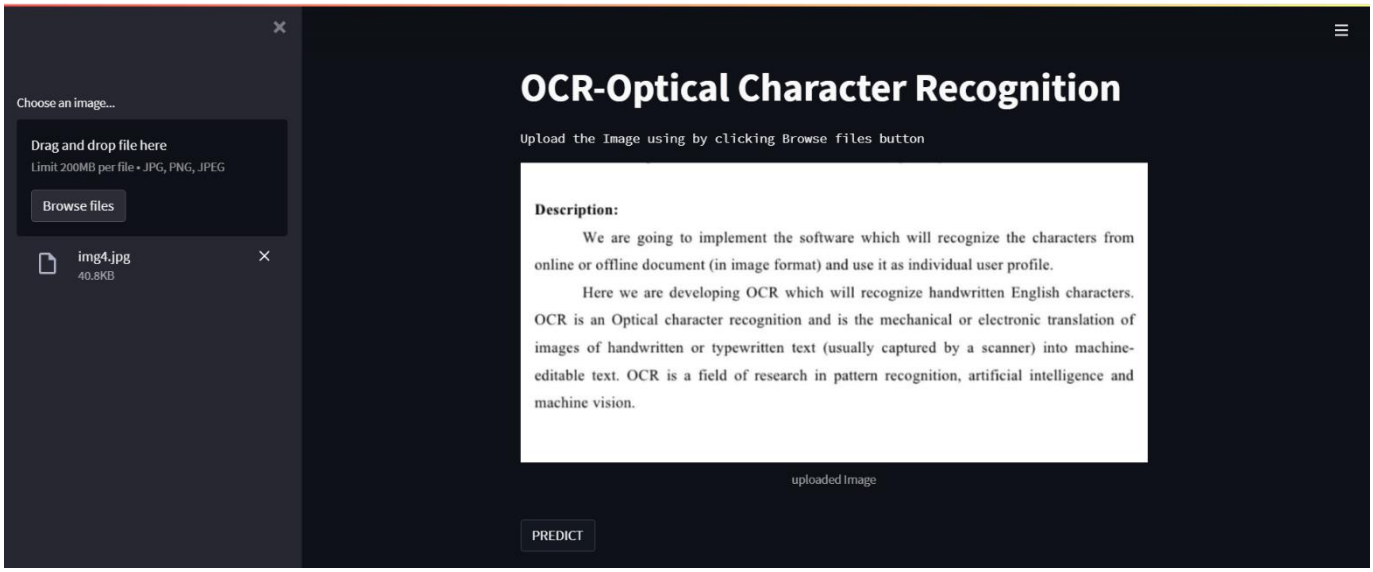

Figure 5.2 Uploaded image screen

The figure 5.3 provides the recognized text as result.

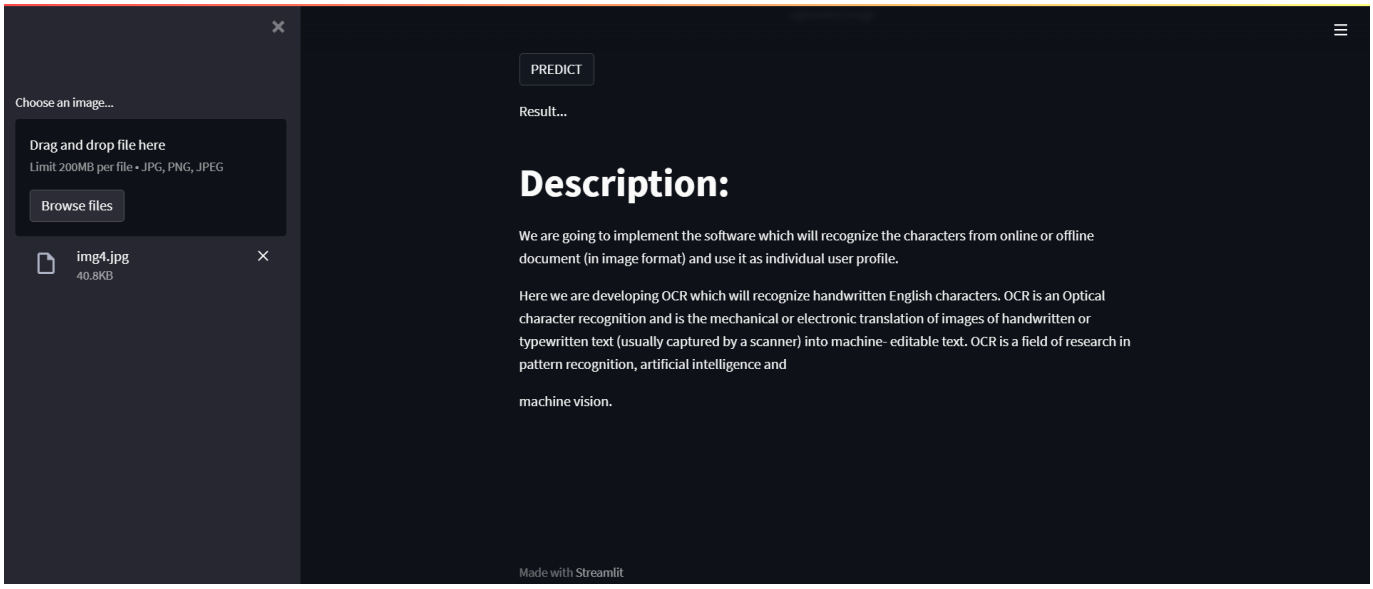

Figure 5.3 Result screen

Chapter – 6

SOFTWARE TESTING

6.1 Sorts of investigations / Test cases

The table 6.1 provide the detail information about the test case

Table 6.1 Test Case

Test case id	Test case name	User action	Input data	Expected results	Actual result	Test status(pass/fail)
1	Upload image file	Correct image upload	Image file	Image is displayed	Character in images displayed	Pass
2	Upload pdf or word		Pdf file	Error	Error	Pass

Chapter – 7

CONCLUSION AND FUTURE WORK

The project has been completed successfully with the maximum satisfaction of the organization. The constraints are meet and overcome successfully. Here the characters which is present in the image file they can easily get from this application. The recognition accuracy is good when the image is visible clearly and consist of alphabet and digits.

The future works are:

1. We can make the application to recognize different languages.
2. We will increase the size of uploading files.
3. We will enhance the user interface.

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