**BTP Evaluation Progress Report**

**Source Code**

Sumbitted by:

Jasraj Singh Chhabda (111915051)

Harsh Prakash (111915041)

Aryan Sharma (111915018)

Amrendra Shendkar (111915013)

Ashish Biswal (111916013)

**Main:**

\documentclass[12pt]{report}

\usepackage{graphicx}

\usepackage{tabu}

\usepackage{geometry}

\usepackage{minitoc}

\usepackage{amsmath}

\usepackage{algorithm}

\usepackage[noend]{algpseudocode}

\usepackage[sorting=none]{biblatex}

\addbibresource{reference.bib}

\usepackage{amssymb}

\usepackage{listings}

\usepackage{dirtytalk}

\usepackage{enumitem}

\setlist[enumerate]{itemsep=0mm}

\setlist[itemize]{itemsep=0mm}

\usepackage{graphicx}

\graphicspath{ {./figures/} }

%multiple columns can be created

\usepackage{multicol}

\usepackage{xcolor}

\usepackage{subcaption}

\definecolor{codegreen}{rgb}{0,0.6,0}

\definecolor{codegray}{rgb}{0.5,0.5,0.5}

\definecolor{codepurple}{rgb}{0.58,0,0.82}

\definecolor{backcolour}{rgb}{0.95,0.95,0.92}

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backgroundcolor=\color{backcolour},

commentstyle=\color{codegreen},

keywordstyle=\color{magenta},

numberstyle=\tiny\color{codegray},

stringstyle=\color{codepurple},

basicstyle=\ttfamily\footnotesize,

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breaklines=true,

captionpos=b,

keepspaces=true,

numbers=left,

numbersep=5pt,

showspaces=false,

showstringspaces=false,

showtabs=false,

tabsize=2

}

\lstset{style=mystyle}

\usepackage{sectsty}

\chapterfont{\centering}

\geometry{a4paper, tmargin=1in, rmargin=1in, bmargin=1in, lmargin=1in}

\usepackage{cryptocode}

% sets roll number , name and title

\newcommand{\rollnos}{111915051, 111915041, 111915018, 111915013, 111916013}

\newcommand{\names}{Jasraj Singh Chhabda, Harsh Prakash, Aryan Sharma, Amrendra Shendkar, Ashish Biswal}

\newcommand{\nameMIS}{

Jasraj Singh Chhabda (111915051)\\

Harsh Prakash (111915041)\\

Aryan Sharma (111915018)\\

Amrendra Shendkar (111915013)\\

Ashish Biswal (111916013)}

\newcommand{\topic}{Image Processing for Mask Detection}

\newcommand{\guide}{Dr. Rahul Dixit}

\newcommand{\hod}{Dr. Tanmoy Hazra}

\usepackage{fancyhdr}

\pagestyle{fancy}

\fancyhf{}

\fancyhead[RE,LO]{\topic}

\fancyfoot[RE,LO]{\leftmark}

\fancyfoot[LE,RO]{\thepage}

\renewcommand{\headrulewidth}{1pt}

\renewcommand{\footrulewidth}{1pt}

\renewcommand\*\contentsname{\hfill\textbf{\textbf{\fontsize{16pt}{24pt}\selectfont TABLE OF CONTENTS}} \hfill}

\renewcommand{\bibname}{REFERENCES}

\setcounter{tocdepth}{1}

\begin{document}

\include{mytitle}

\pagenumbering{gobble}

\include{bonafide}

\include{acknowledgement}

\addcontentsline{toc}{chapter}{ABSTRACT}

\pagenumbering{roman}

\input{abstract}

\tableofcontents

\cleardoublepage

\addcontentsline{toc}{chapter}{\listfigurename}

\listoffigures

\cleardoublepage

\addcontentsline{toc}{chapter}{\listtablename}

\listoftables

%\cleardoublepage

%\addcontentsline{toc}{Chapter}{Listing}

\lstlistoflistings

\cleardoublepage

\chapter{ Introduction} \label{ch:intro}

\pagenumbering{arabic}

\input{Chapter1}

\chapter{Motivation} \label{ch:background}

\input{Chapter2}

\chapter{Literature Review} \label{ch:literature\_review}

\input{Chapter3}

\chapter{Objectives} \label{ch:main\_chapter1}

\input{Chapter4}

\chapter{Research Gaps} \label{ch:main\_chapter2}

\input{Chapter5}%

\chapter{Methodology} \label{ch:proposal}

\input{Chapter6}

\chapter{Work Done So Far} \label{ch:experimental\_results}

\input{Chapter7}

\chapter{Conclusion} \label{ch:conclusion}

\input{Conclusion}

\chapter{References} \label{ch:conclusion}

\input{Conclusion}

\printbibliography

\end{document}

MY TITLE:

\begin{titlepage}

\begin{center}

\fontsize{20pt}{20pt} \selectfont \textbf{IMAGE PROCESSING - MASK DETECTION}

\vspace\*{1cm}

\fontsize{13pt}{13pt} \selectfont {A Project report submitted in partial fulfillment of the requirements for the award of the degree of}

\vspace\*{0.8cm}

\fontsize{14pt}{1cm}\selectfont\textbf{\textit{BACHELOR'S OF TECHNOLOGY } }

\textbf{in\\}

\fontsize{14pt}{1cm}\selectfont\textbf{\textit{COMPUTER SCIENCE AND ENGINEERING}}

\vspace\*{0.4cm}

by

\vspace\*{0.4cm}

\textbf{\nameMIS}\\

\vspace\*{0.5cm}

\begin{center}

\includegraphics[width=2.5in]{iiitp\_logo.png}

\end{center}

\vspace\*{0.5cm}

\fontsize{12pt}{0.5cm}\selectfont \textbf{DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING}\\

\vspace\*{0.5cm}

\fontsize{12pt}{12pt}\selectfont \textbf{Indian Institute of Information And Technology Pune}\\

\vspace\*{0.5cm}

\fontsize{12pt}{12pt}\selectfont \textbf{Near Bopdev Ghat, Kondhwa Annexe, Yewalewadi, Pune, Maharashtra 411048}\\

\vspace\*{1.3cm}

\fontsize{12pt}{12pt}\selectfont\textbf{JUNE 2020}

\end{center}

\end{titlepage}

BONAFIDE:

\thispagestyle{plain}

\begin{center}

\fontsize{16pt}{14pt}\selectfont\textbf{BONAFIDE CERTIFICATE}

\end{center}

\vspace{0.3cm}

% Enter the title of your project in the section where it says PROJECT NAME

\fontsize{12pt}{24pt}\selectfont This is to certify that the project report entitled \textbf{“Image Processing for Mask Detection”} submitted by \textbf{\names} bearing the \textbf{MIS Nos: \rollnos} respectively, in completion of his project work under the guidance of \textbf{\guide} is accepted for the project report submission in partial fulfillment of the requirements for the award of the degree of Master of Technology in Computer Science and Engineering in the Department of Computer Science and Engineering, Indian Institute of Information Technology,Pune, during the academic year 2020-21.

\vspace{2.5cm}

\fontsize{12pt}{20pt}\selectfont

\noindent

\begin{tabu}{X[l] l}

\textbf{\guide } & \textbf{\hod} \\

Project Guide & Head of the Department\\

Professor & Assistant Professor\\

Department of CSE & Department of CSE\\

IIIT Pune & IIIT Pune\\

\end{tabu}

\vspace{2.0cm}

\noindent

\begin{tabular}{lc}

\fontsize{12pt}{24pt}\selectfont Project Viva-voce held on & \underline{\hspace{2in}}

\end{tabular}

\vspace{3.5cm}

\fontsize{12pt}{18pt}\selectfont

\noindent

\begin{tabu} to \textwidth { X[l] X[c] }

\textbf{Internal Examiner} & \textbf{External Examiner}

\end{tabu}

\newpage

ACKNOWLEDGEMENT:

\begin{center}

\textbf{\textbf{\fontsize{16pt}{24pt}\selectfont ACKNOWLEDGEMENT}}

\end{center}

\vspace{0.3cm}

\fontsize{12pt}{24pt}\selectfont

This project would not have been possible without the help and cooperation of many. I would like to thank the people who helped me directly and indirectly in the completion of this project work.\par

\hspace{0.3cm} First and foremost,\hspace{0.1cm} I would like \hspace{0.1cm} to express \hspace{0.1cm} my gratitude \hspace{0.1cm} to our beloved \hspace{0.1cm} director,\hspace{0.3cm} \textbf{Dr.Anupam Shukla}, for providing his kind support in various aspects. \par

I would like to express my gratitude \ to \ my project guide \ \textbf{\guide}, Professor, Department of CSE, for providing excellent guidance, encouragement, inspiration, constant and timely support throughout this M.Tech project.\par

I would like to express my gratitude to the head of department \textbf{\hod}, Professor, Department of CSE, for providing his kind support in various aspects.\par

I would also like to thank all the faculty members in the Dept. of CSE and my classmates for their steadfast and strong support and engagement with this project.

ABSTRACT:

\begin{center}

\textbf{\textbf{\fontsize{16pt}{24pt}\selectfont Abstract}}

\end{center}

Main aim of Image processing project is to extract important data from images. Using this extracted information description, interpretation and understanding of the scene can be provided by the machine. Main point of image processing is to modify images in to desired manner. This system allows users to take hard copy of the image using printer routines and provides option for users to store file in to disk in different formats. In other words image processing is called as altering and analyzing pictorial information of images. In our daily life we come across different type of image processing best example of image processing in our daily life is our brain sensing lot of images when we see images with eyes and processing is done is very less time. \par

In existing system there are many techniques which are available for extracting information from images but there are no exact processing is defined. In proposed system we will come across different new techniques in image processing. \par

Conclusion \par

\textbf{\textit{Keywords : }} Image, Processing, extract, data, information, modify,

CHAPTER 1:

\section{Image Processing}

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.

\section{Basic Steps}

Image processing basically includes the following three steps: \\

1. Importing the image via image acquisition tools.\\

2. Analysing and manipulating the image.\\

3. Output in which result can be altered image or report that is based on image analysis.\\

There are two types of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. Digital image processing techniques help in manipulation of the digital images by using computers. The three general phases that all types of data have to undergo while using digital technique are pre-processing, enhancement, and display, information extraction.

\section{Overview}

In this lecture we will talk about a few fundamental definitions such as image, digital image, and digital image processing. Different sources of digital images will be discussed and examples for each source will be provided. The continuum from image processing to computer vision will be covered in this lecture. Finally we will talk about image acquisition and different types of image sensors.

CHAPTER 2:

In the new world of coronavirus, multidisciplinary efforts have been organized to slow the spread of the pandemic. The AI community has also been a part of these endeavors. In particular, developments for monitoring social distancing or identifying face masks have made-the-headlines.\\

But all this hype and anxiety to show off results as fast as possible, added up to the usual AI overpromising factor (see AI winter), may be signaling the wrong idea that solving some of these use cases is almost trivial due to the mighty powers of AI.\\

In an effort to paint a more complete picture, we decided to show the creative process behind a solution for a seemingly simple use case in computer vision:\\

1. Detect people that pass through a security-like camera.\\

2. Identify face mask usage.\\

3. Collect reliable statistics (people wearing masks).\\

CHAPTER 3:

\section{What is Image Classification?}

A common use of machine learning is to identify what an image represents. For example, we might want to know what type of animal appears in the following photograph.\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.5]{dog.jpg}

\caption{Sample Image of a Dog}

\label{fig:test}

\end{figure}\\

The task of predicting what an image represents is called image classification. An image classification model is trained to recognize various classes of images. For example, a model might be trained to recognize photos representing three different types of animals: rabbits, hamsters, and dogs.\\\\

When we subsequently provide a new image as input to the model, it will output the probabilities of the image representing each of the types of animal it was trained on. An example output might be as follows:\\

\begin{center}

\begin{tabular}{||c c||}

\hline

Animal Type & Animal Probability \\ [0.5ex]

\hline\hline

Rabbit & 0.07\\

\hline

Hamster & 0.02\\

\hline

Dog & 0.91 \\

\hline

\end{tabular}

\end{center}\\

For simple understanding:\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.5]{btp1.jpg}

\caption{Simpler portrayal of Classification of an Image}

\label{fig:test}

\end{figure}\\

\vspace\*{3.5in}

\section{What is Object Detection?}

Given an image or a video stream, an object detection model can identify which of a known set of objects might be present and provide information about their positions within the image.\\

For example, this screenshot of our example application shows how two objects have been recognized and their positions annotated:\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.15]{android\_apple\_banana.png}

\caption{Image Detection Screenshot}

\label{fig:test}

\end{figure}\\

An object detection model is trained to detect the presence and location of multiple classes of objects. For example, a model might be trained with images that contain various pieces of fruit, along with a label that specifies the class of fruit they represent (e.g. an apple, a banana, or a strawberry), and data specifying where each object appears in the image.\\

When we subsequently provide an image to the model, it will output a list of the objects it detects, the location of a bounding box that contains each object, and a score that indicates the confidence that detection was correct.\\

\section{Model Output}

Imagine a model has been trained to detect apples, bananas, and strawberries. When we pass it an image, it will output a set number of detection results - in this example,\\

\begin{center}

\begin{tabular}{||c c c||}

\hline

Class & Score & Locations \\ [0.5ex]

\hline\hline

Apple & 0.92 & [18, 21, 57, 63]\\

\hline

Banana & 0.88 & [100, 30, 180, 150]\\

\hline

Strawberry & 0.0.87 & [7, 82, 89, 163]\\

\hline

Banana & 0.23 & [42, 66, 57, 83]\\

\hline

Apple & 0.11 & [6, 42, 31, 58]\\

\hline

\end{tabular}

\end{center}\\

\section{Confidence Score}

To interpret these results, we can look at the score and the location for each detected object. The score is a number between 0 and 1 that indicates confidence that the object was genuinely detected. The closer the number is to 1, the more confident the model is.\\

Depending on your application, you can decide a cut-off threshold below which you will discard detection results. For our example, we might decide a sensible cut-off is a score of 0.5 (meaning a 50 percent probability that the detection is valid). In that case, we would ignore the last two objects in the array, because those confidence scores are below 0.5\\

CHAPTER 4:

\section{Our Aim}

To detect, classify and differentiate masked and unmasked people with a reasonably acceptable accuracy using various supplementary libraries:\\

\subsection{Python}

\begin{figure}[h]

\centering

\includegraphics[scale=0.3]{obj1.jpg}

\caption{Python Logo}

\label{fig:test}

\end{figure}\\

\subsection{TensorFlow}

\begin{figure}[h]

\centering

\includegraphics[scale=0.2]{obj2.jpg}

\caption{TensorFlow Logo}

\label{fig:test}

\end{figure}\\

\subsection{OpenCV}

\begin{figure}[h]

\centering

\includegraphics[scale=0.3]{obj3.jpg}

\caption{OpenCV Logo}

\label{fig:test}

\end{figure}\\

CHAPTER 5:

\section{Dataset with enough variety to deal with current variety of Masks }\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.1]{gap1.jpeg}

\caption{Sample 1}

\label{fig:test}

\end{figure}\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.2]{gap2.jpg}

\caption{sample 2}

\label{fig:test}

\end{figure}\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.1]{gap3.jpg}

\caption{Sample 3}

\label{fig:test}

\end{figure}\\

\section{Datasets are resourced from Kaggle, Github which are Independent and therefore we lack total control over it.

}\\

\subsection{Kaggle}

\begin{figure}[h]

\centering

\includegraphics[scale=0.3]{kag.jpg}

\caption{Kaggle Logo}

\label{fig:test}

\end{figure}\\

\subsection{GitHub}

\begin{figure}[h]

\centering

\includegraphics[scale=0.4]{git.jpg}

\caption{GitHub Logo}

\label{fig:test}

\end{figure}\\

CHAPTER 6:

\section{Steps We Are Following}

Methodology:\\

1. Decided on the problem statement after much though around the Current affairs happening around the world vis-à-vis the Pandemic and how we could work around that. \\

2. Sourcing the Dataset from pre-existing images on relevant sites. \\

3. Processing the dataset to optimize it for our Problem statement.\\

4. Model Selection for an appropriate fit. \\

\begin{figure}[h]

\centering

\includegraphics[scale=0.7]{method.jpg}

\caption{Model Selection}

\label{fig:test}

\end{figure}\\

Above is the chronology that is being followed.\\

5. Optimising it for the Dataset.\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.8]{smiley.jpg}

\caption{Original Picture}

\label{fig:test}

\end{figure}\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.4]{smiley.jpg}

\caption{Downsizing}

\label{fig:test}

\end{figure}\\

\begin{figure}[h]

\centering

\includegraphics[scale=0.4]{smiley1.jpg}

\caption{Color Optimization}

\label{fig:test}

\end{figure}\\

Currently our code can work on just black and white images\\

6. Using OpenCV to employ a realtime detection for a video input

\begin{figure}[h]

\centering

\includegraphics[scale=0.8]{method1.jpg}

\caption{Realtime Detection}

\label{fig:test}

\end{figure}\\

7. Testing it for a varying choice of parameters and Hyperparameters. \\

\begin{figure}[h]

\centering

\includegraphics[scale=0.8]{alpha.jpg}

\caption{Parameters}

\label{fig:test}

\end{figure}\\

8. Deploying the final model.\\

CHAPTER 7:

\section{ Obtained some part of the dataset.}

\section{Decided on what processing to do for optimum results.}

\section{Got Acquainted with the Various Algorithms involved and the Libraries used to implement them.}

CONCLUSION:

We hope to achieve a tangible impact over a real world problem that is actively plaguing the world using the recent advances in Data collection, Processing, Analysis and the application of Machine learning on the data.

\section{REFERENCES}

\subsection{Andrew Ng/Deeplearning.ai }

\begin{figure}[h]

\centering

\includegraphics[scale=0.2]{ml.png}

\caption{Parameters}

\label{fig:test}

\end{figure}\\

\subsection{Coursera }

\begin{figure}[h]

\centering

\includegraphics[scale=0.2]{coursera.png}

\caption{Parameters}

\label{fig:test}

\end{figure}\\

\subsection{Ashish Jhangra/Kaggle }

\subsection{ThePerceptron/YouTube }