2022

UG Project Report on

SMART MATHEMATICS TUTOR-INTERACTIVE LEARNING APPLICATION FOR STUDENTS USING IBM WATSON

SUBMITTED BY

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2019_ 2023

CONTENTS

CHAPTERS PAGE NO'S

CHAPTER 1

INTRODUCTION

OVERVIEW

Nationally, the average age at which kids get a phone of their own is 10.3 years. One thing experts agree on is that later is better. Once you open the door, it can be very difficult to close. A 2016 study found that most kids are getting their first social media account between the ages of 10 and 12. This will ultimately lead to unproductive work. Due to lack of interactive learning students doesn't show much interest in learning things. Interactive Learning is a pedagogical approach that incorporates social networking and urban computing into course design and delivery. Interactive Learning has evolved out of the hyper-growth in the use of digital technology and virtual communication, particularly by students. Beginning around 2000, students entering institutes of higher education have expected that interactive learning will be an integral part of their education. The use of interactive technology in learning for these students is as natural as using a pencil and paper were to past generations.

To solve the above mentioned problem we are building a GUI which helps the students in learning maths and they can easily remember all the formulas. They can draw the shapes in the application which recognizes the shape gives all the related information like list of formulas. This helps the students to learn interactively.

Smart Maths tutor system is a web based graphical user interface where a user gets to draw shapes of mathematical figures such as square, triangle, circle etc. for which the output would be related formulas to the drawn figure.

1.2 PURPOSE

Our project 'Smart Mathematics Tutor includes shape recognition system The aim of our project is to create tutoring assistant which will prove to be effective in helping students to practice shape recognition exercises. For the assistant to provide the needed guidance to a student who are learning to recognise the shapes, it is necessary to take into consideration both the shape that is needed to be recognised, as well as the name of the shape proposed by the leamer.

CHAPTER 2

LITERATURE SURVEY

2.1 EXISTING PROBLEM

This tutoring asastant will use a shape generator designed to test the knowledge of the student. This shape generator is created by our team to form different shape so that the students can try guess the name of the shapes and find if their answer was correct or not which will help them build their knowledge in an easy way Shape detection is the identification of a shape in the image along with its localisation and classification. It has wide spread applications and is a critical component for Al based software systems. And by using this shape detection our tutor will help students learn about different shapes.

2.2 PROPOSED SOLUTION

Shape detection is the identification of a shape in the image along with its localization and classification It has wide spread applications and is a critical component for AI based software systems This report seeks to perform a rigorous survey of modern shape detection algorithms that use Machine learning. As part of the survey, the topics explored include various algorithms, quality metrics, speed/size trade-offs and training methodologies This report focuses on the two types of Shape detection algorithms - CNN and Data Pre-processing Techniques to construct detectors that are portable and fast on low powered devices are also addressed by exploring new lightweight convolutional base architectures Ultimately, a rigorous review of the strengths and weaknesses of each detector leads us to the present state of the art.

CHAPTER 3

THEORETICAL ANALYSIS

3.1 BLOCK DIAGRAM

SYSTEM DESIGN

The figure 1 depicts the architectural diagram of proposed system System designs the main aim of this structure incorporated in study can fetch out data from economic news and propose this sets into prognosticate model Major phases in formulated system include data collection and pre-processing, feature and factor selection and price appraisal and prediction. In the initial hand, news, financial and market data are gathered and processed In Further aspect, unstructured documents are modified into structured extract by CNN classification Data retrieval and pre-processing in data retrieval, datasets can be fetched such of news data, black gold price data and market data Dataset from news can be retrieved through headlines as it is easier to obtain and justifies in one line. Factors that affect the reduction are expert business, stock market and later business. Sentimental Analysis In this era of modernization, big data is also assisting through study of sentiment analyas which focuses on retrieving data through news and proposing prediction model. In this kind of analysis dictionary-based approach is accounted to gather the data regarding markets and essential factors affecting it. In case of trend prediction, the sentiment and prediction models are considered as variables Back Propagation Back-propagation is considered as an algorithm which can be used for the purpose of training feed forward neural networks for prognosticate learning model. This leads to the attainably use gradient methods to teach multi-layer networks, by modifying weights to minimum loss.

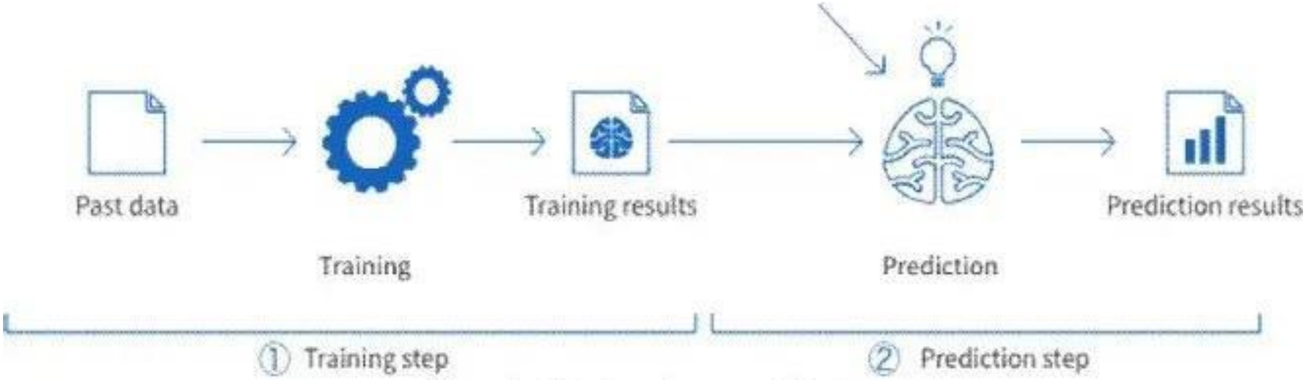


Fig 3.1. Architecture

3.2 HARDWARE / SOFTWARE DESIGNING

The hardware required for the development of this project is:

Processor	: Intel CoreTM i5-9300H
Processor speed	: 2.4GHz
RAM Size	: 8 GB DDR
System Type	: X64-based processor

SOFTWARE DESIGNING:

The software required for the development of this project is:

Desktop GUI	: Anaconda Navigator
Operating system	: Windows 11
Front end	: HTML, CSS
Programming	: PYTHON

CHAPTER 4

EXPERIMENTAL INVESTIGATION

IMPORTING AND READING THE DATASET

Importing the Libraries

First step is usually importing the libraries that will be needed in the program.

- Tensorflow
- Keras
- FLask
- Numpy
- Matplotlib

Reading the Dataset

For this project, we make use of data set ’H-1B Visa Petitions 2011-2016 dataset’We will be selecting the important features from the dataset that will help us in predicting the h1b visa approvalThe next step is to read the dataset into a data structure that’s compatible with pandas. Let’s load a .csv data file into pandas. There is a function for it, called **read_csv().**

We will need to locate the directory of the CSV file at first (it’s more efficient to keep the dataset in the same directory as your program).If the dataset in same directory of your program, you can directly read it, without any path. After the next Steps we made following bellow:

1.Data visualization
2.Collabrative and filtering
3.Creating the Model
4.Test and save the model
5.Buil Python Code
6.Build HTML Code
7.Run the Application
We are the following above sections we did and investigate it.

CHAPTER 5

FLOWCHART

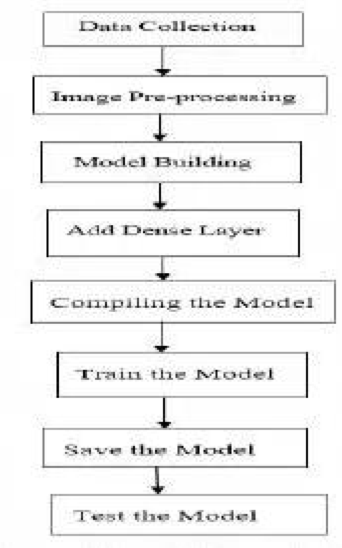


Fig 5.1 Flowchart of the project

Project Flow:

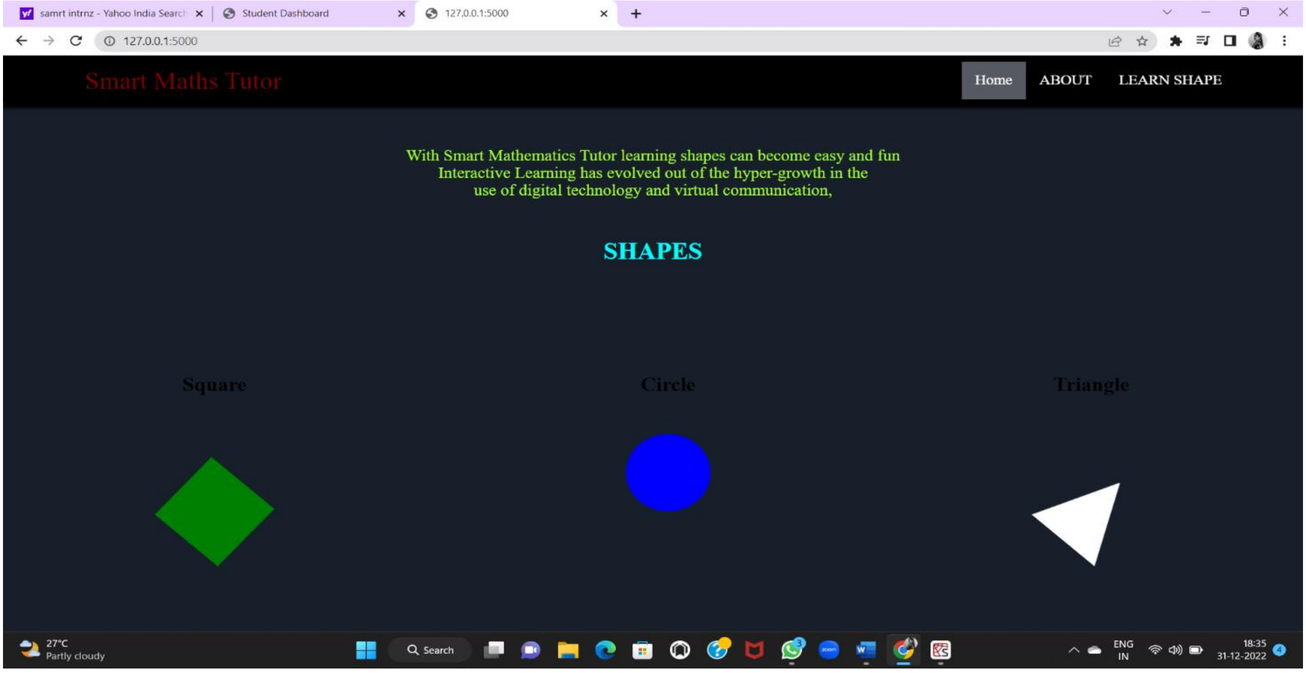
- User interacts with the UI (User Interface) to launch the tutor.
- Then in the GUI we will be drawing a shape.
- And finally, with the help of our model we will be predicting and using opencv to showcase the respective formula.

To accomplish this, we have to complete all the activities and tasks listed below

- Data Collection.
  - Collect the dataset or Create the dataset
- Data Preprocessing.
  - Import the ImageDataGenerator library
  - Configure ImageDataGenerator class
  - Apply ImageDataGenerator functionality to Trainset and Testset
- Model Building
  - Import the model building Libraries
  - Initializing the model
  - Adding Input Layer
  - Adding Hidden Layer
  - Adding Output Layer
  - Configure the Learning Process
  - Training and testing the model
  - Save the Model
- Application Building
  - Create an HTML file
  - Build Python Code

CHAPTER 6

RESULT



With Smart Mathematics Tutor learning shapes can become easy and fun Interactive Learning has evolved out of the hyper-growth in the use of digital technology and virtual communication,

Fig 6.1.Home Page

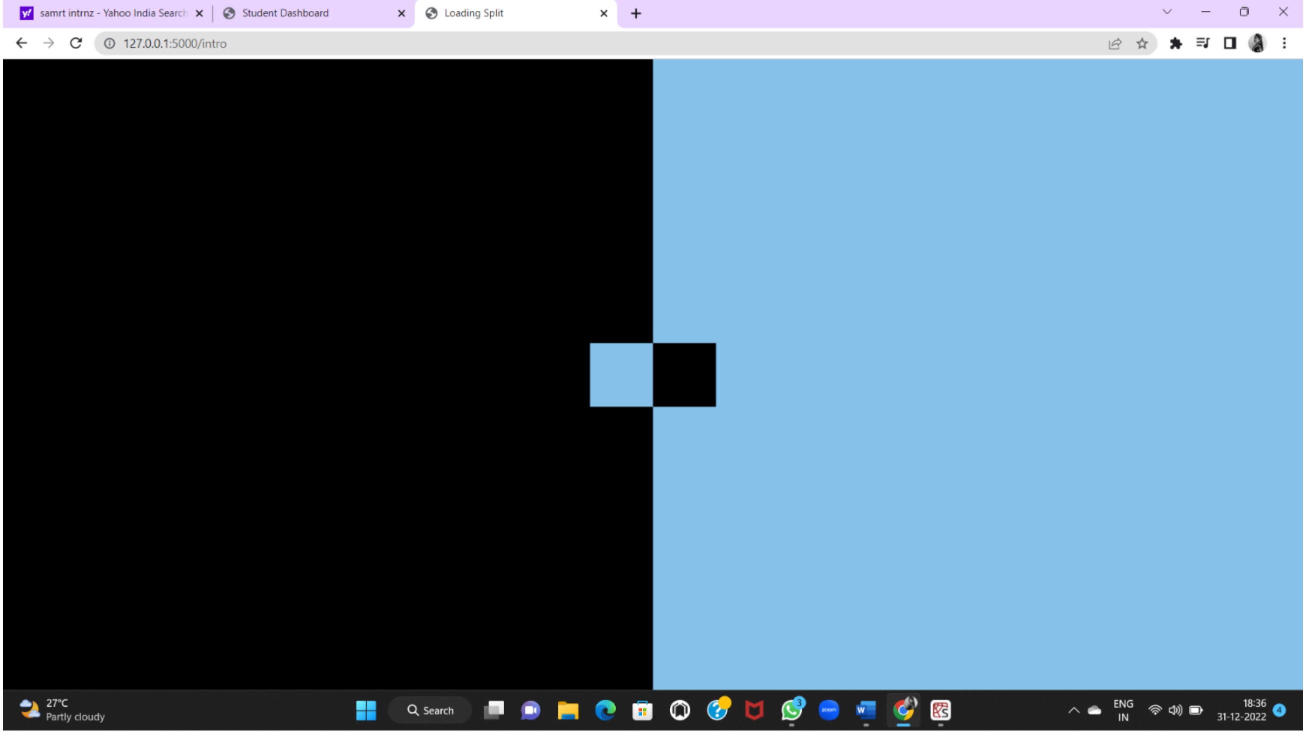
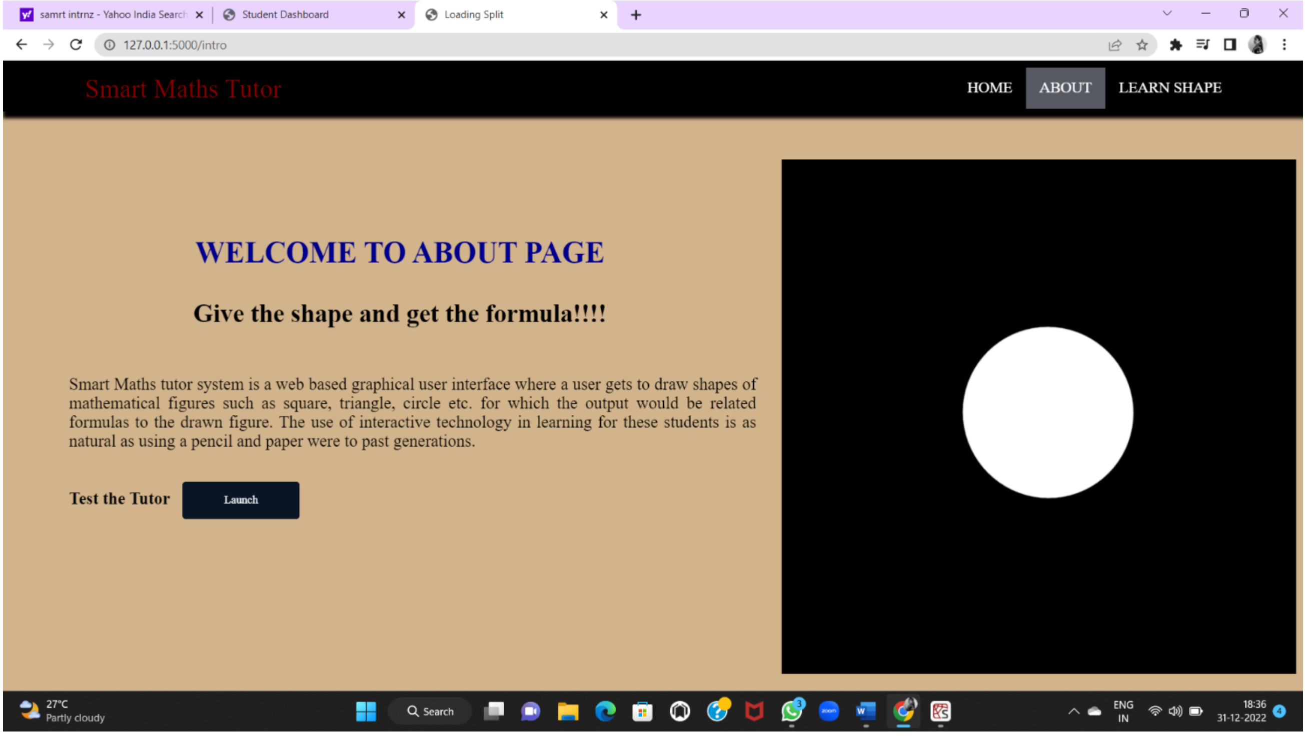


Fig 6.2.Home page



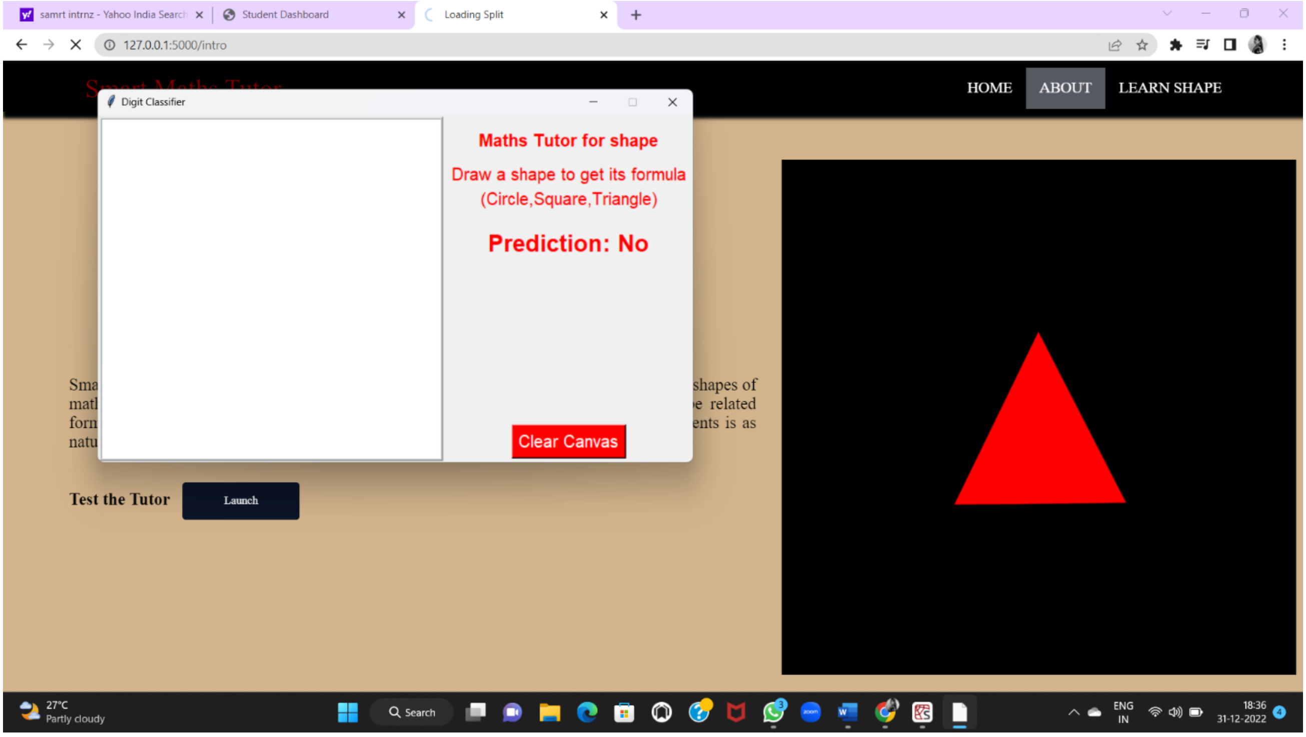
WELCOME TO ABOUT PAGE

Give the shape and get the formula!!!!

Smart Maths tutor system is a web based graphical user interface where a user gets to draw shapes of mathematical figures such as square, triangle, circle etc. for which the output would be related formulas to the drawn figure. The use of interactive technology in learning for these students is as natural as using a pencil and paper were to past generations.

Test the Tutor

Fig 6.3.About page



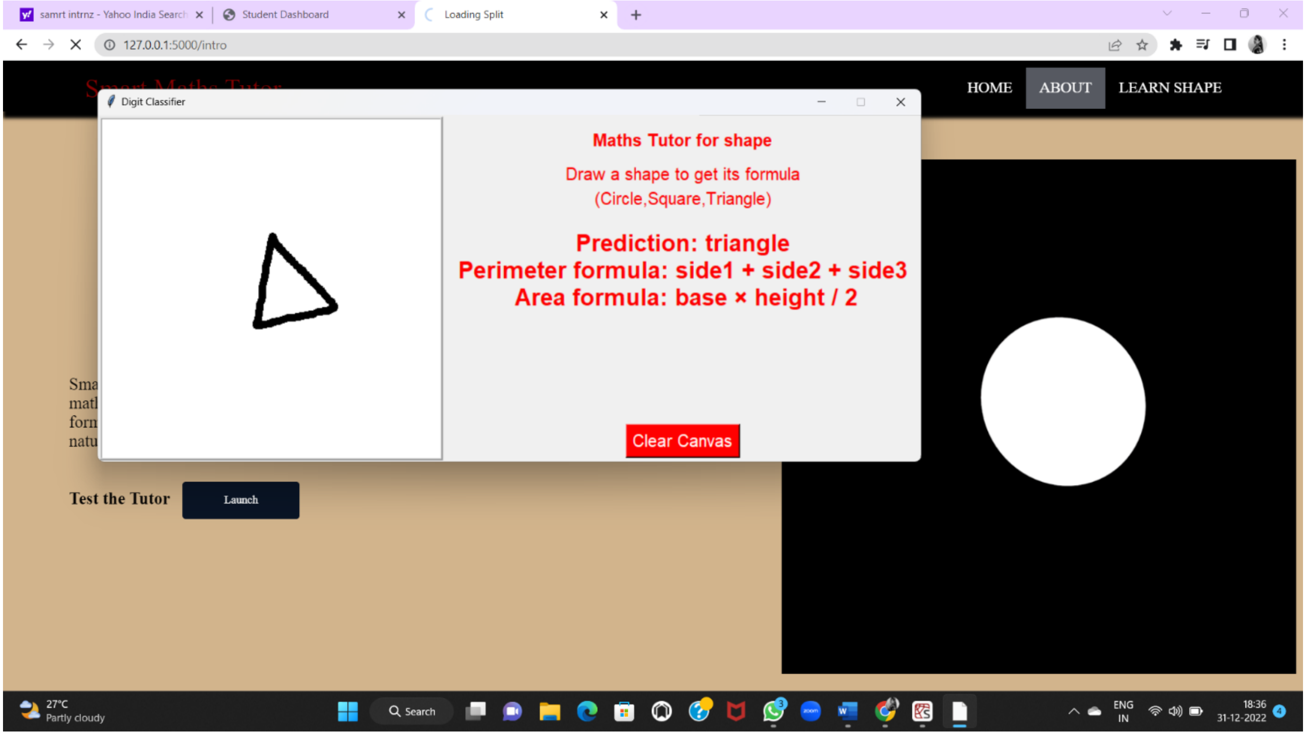
Maths Tutor for shape

Draw a shape to get its formula (Circle,Square,Triangle)

Prediction: No

Test the Tutor

Fig 6.4.Prediction page

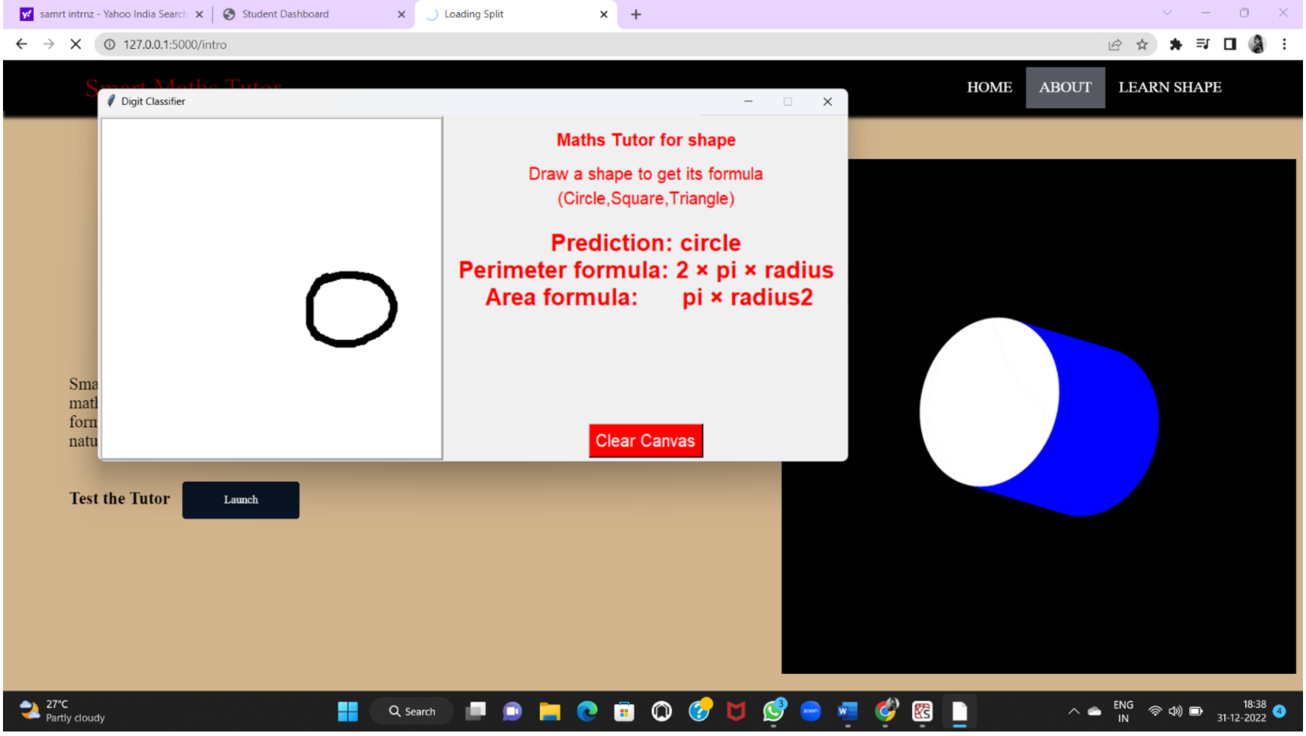


Maths Tutor for shape

Draw a shape to get its formula
(Circle,Square,Triangle)

Prediction: triangle
Perimeter formula: side1 + side2 + side3
Area formula: base × height / 2

Fig 6.5.Prediction page of Triangle

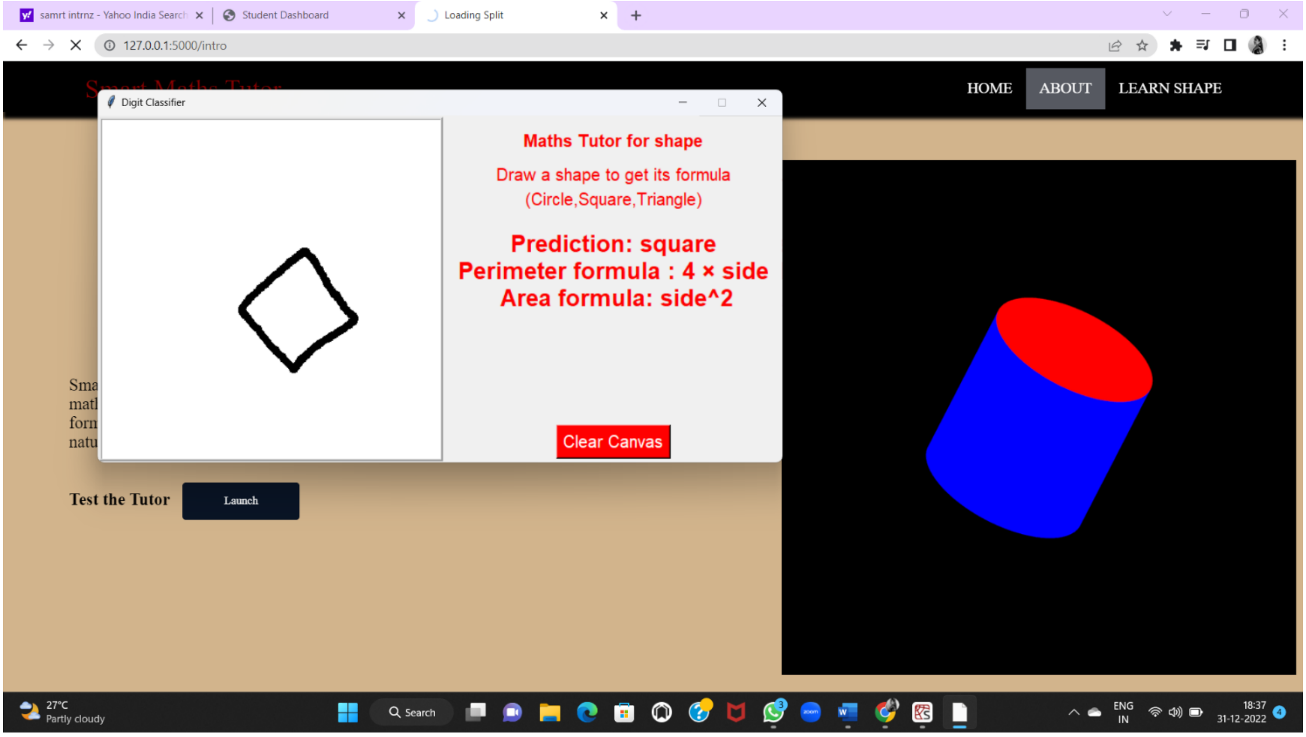


Maths Tutor for shape

Draw a shape to get its formula
(Circle,Square,Triangle)

Prediction: circle
Perimeter formula: 2 × pi × radius
Area formula: pi × radius2

Fig 6.6.Prediction page of Circle



Maths Tutor for shape

Draw a shape to get its formula
(Circle,Square,Triangle)

Prediction: square
Perimeter formula : 4 × side
Area formula: side^2

Fig 6.7.Prediction page of Square

CHAPTER 7

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- Interactive learning in the classroom help students prepare more successfully for the outside world than those who do not. Engaged learners who actively participate in their own education are more apt to remember more from a lesson and then transfer newly acquired skills to different situations.
- Online Coaching is Convenient
- No Travel Required
- Flexible Timing
- Self-Learning

DISADVANTAGES

- The Student must be Dedicated.
- The Tutor's Quality Matters.
- Technical Glitches can Affect Online Tutoring.

CHAPTER 8

APPLICATIONS

- Can be applied in each and every students individual's Daily Life.

- Smart Maths tutor system is a web based graphical user interface where a user gets to draw shapes of mathematical figures such as square, triangle, circle etc. for which the output would be related formulas to the drawn figure.

- Every tutoring session is aimed at meeting a specific objective which eventually helps you achieve at school and beyond.

- The use of interactive technology in learning for these students is as natural as using a pencil and paper were to past generations.

CHAPTER 9

CONCLUSION AND FUTURESCOPE

CONCLUSION

We presented a new shape description and classification method. Key characteristics of our approach are the compound descriptor Rese and classifier that join the region and contour-based features We suggested an online learning method to extend the representative arch set and increase performance. We proposed a representative set optimizing algorithm as well

The core idea behind our method is the two-level description and classification for an input shape, low-level, global statistical information is extracted to roughly select the set of similar objects and to reject obviously different templates. In the second stage, local edge information is investigated to find the closest known shape but with the ability to reject the match. The refusal is based on the acceptance radius that is specified individually for every item in the representative set according to the properties of the local proximity in the feature set

Results demonstrate a high precision rate (99.83%) and an acceptable recall rate (60.53%), which fulfil the requirements for a safety-oriented visual application processing an image flow. The reason to have lower cover is that input frames contain highly deformed shapes, which, for make of reliability, are classified as nonrelevant inputs. The recall is acceptable, as long asa continuous input is available Compared to other classifiers, none of the tested ones could outperform the AL-NN in precision, and the same recall could only be reproduced with a gnificantly lower precision. If a final decision is made based on multiple input frames and multiple clues, the false-positive error can be minimized to be practically negligiblecapable of are looking for the H1B visa approval reputation. This can be very beneficial for overseas employees traveling to the United States.

FUTURESCOPE

This report elucidates shape detection, one of the highly computational applications that has become possible in recent years Although detecting shapes in a given image or video frame has been around for years, it is becoming more widespread across a range of industries now more than ever before. Shape detection in images and video has received lots of attention in the computer vision and pattern recognition communities over recent years. We have had great progress in the field, processing a angle image used to take 20 seconds per image and today it takes less than 20 milliseconds. Of the problems related to these fields, analysing an image and recognizing all shapes remains to be one of the most challenging ones Although the posabilities are endless when it comes to future use cases for shape detection, there are still agnificant challenges remaining Herewith are some of the main useful applications of shape detection: Vehicle's Plates recognition, self-driving cars, tracking shapes, face recognition, medical imaging, shape counting, shape extraction from an image or video, person detection. The future of shape detection technology is in the process of proving itself, and much like the original Industrial Revolution, it has the potential to free people from menial jobs that can be done more efficiently and effectively by machines. It will also open up new avenues of research and operations that will repeat additional benefits in the future. Thus, these challenges circumvent the need for a lot of training requiring a massive number of datasets to serve more nuanced tasks, with its continued evolution, along with the devices and techniques that make it possible, it could soon become the next big thing in the future.

CHAPTER 10

BIBILOGRAPHY

[1] Jose Paladiner and Jaime Ramirez A Systematic Literature Review of Intelligent Tutoring Systems With Dialogue in Natural Language" (2020).

[2] Lu Guo, Dong Wang Fei Gu, Yazheng Li, Yezhu Wang and Rongting Zhou "Evolution and trends in intelligent tutoring systems research a multidisciplinary and scientometric view" (2021).

[3] Nour N Abueloun, Samy S Abu Naser "Mathematics intelligent tutoring system" (2017)

[4] Calvin L. King, Vincent, Kelvin, Harco L. H. S. Warnare, Nurulhuda Nordin and Wiranto H. Utomo "Intelligent Tutoring System Learning Math for 6th- Grade Primary School Students" (2021).

[5] Janvi Madhok, Kashmira Mathur, Goutam Gupta, Deepika Gupta "A LITERATURE SURVEY ON ONLINE PLATFORM: BRIGHT SPARKS TUTORING" (2022)

[6] Dimitrios Martorodimor and Savvas A. Chatzichristofiz "Studying Affective Tutoring Systeme for Mathematical Concepts" (2019)

[7] Richard West, Chair, Peter J. Rich, Stephen Yanchar "Richard West, Chair, Peter J. Rich, Stephen Yanchar" (2017). Lorella Giannandrea and arilena Sansoni "A literature review on Intelligent Tutoring Systems and on student profiling" (2019).

APPENDIX

A Source Code of Flask:

Model.py

```
from tensorflow.keras.models import load_model
import numpy as np
from tensorflow.keras.preprocessing import image


model = load_model("shape.h5") # loading our model

def predict(InputImg):

    img=image.load_img(InputImg,target_size=(64,64)) #load and reshaping the image
    x=image.img_to_array(img)#converting image to array
    x=np.expand_dims(x,axis=0)
    pred=model.predict(x)
    pred=np.argmax(model.predict(x), axis=-1)
    print(pred)
    index=['circle', 'square', 'triangle']
  #  result=str(index[pred[0][0]])
    result = str(index[pred[0]])


    return result
```

App.py

```
@app.route('/launch',methods=['GET', 'POST'])# route to show the predictions in a web UI
def launch():
    class main:
        def __init__(self, master):
            self.master = master
            self.res = ""
            self.pre = [None, None]
            self.bs = 4.5
            self.c = Canvas(self.master,bd=3,relief="ridge", width=400, height=400, bg='white')
            self.c.pack(side=LEFT)
            f1 = Frame(self.master, padx=5, pady=5)
            Label(f1,text="Maths Tutor for shape",fg="red",font=("",15,"bold")).pack(pady=10)
            Label(f1,text="Draw a shape to get its formula",fg="red",font=("",15)).pack()
            Label(f1,text="(Circle,Square,Triangle)",fg="red",font=("",15)).pack()
            self.pr = Label(f1,text="Prediction: No",fg="red",font=("",20,"bold"))
            self.pr.pack(pady=20)

            Button(f1,font=("",15),fg="white",bg="red", text="Clear Canvas",
                  command=self.clear).pack(side=BOTTOM)

            f1.pack(side=RIGHT,fill=Y)
            self.c.bind("<Button-1>", self.putPoint)
            self.c.bind("<ButtonRelease-1>",self.getResult)
            self.c.bind("<B1-Motion>", self.paint)

           def getResult(self,e):
            x = self.master.winfo_rootx() + self.c.winfo_x()
            y = self.master.winfo_rooty() + self.c.winfo_y()
            x1 = x + self.c.winfo_width()
            y1 = y + self.c.winfo_height()
            img = PIL.ImageGrab.grab()
            img = img.crop((x, y, x1, y1))
            img.save("dist.png")
            self.res = str(model.predict("dist.png"))
            self.pr['text'] = "Prediction: "
            if self.res == 'square':
                self.pr['text'] = self.pr['text'] + self.res + "\n Perimeter formula : 4 × side " + "\n Area formula: side^2"
            elif self.res == 'circle':
                self.pr['text'] = self.pr['text'] + self.res + "\n Perimeter formula: 2 × pi × radius " + "\n Area formula:  pi × radius2"
            elif self.res == 'triangle':
                self.pr['text'] = self.pr['text'] + self.res + "\n Perimeter formula: side1 + side2 + side3 " + "\n Area formula: base × height / 2"

            if self.res=='circle':
                image = cv2.imread('circle.png')
                cv2.imshow('circle', image)
                key=cv2.waitKey(0)

                if (key & 0xFF) == ord("c"):
                    cv2.destroyWindow("circle")

            elif self.res=='square':
                image = cv2.imread('square.png')
                cv2.imshow('square', image)
```

```
                key=cv2.waitKey(0)

                if (key & 0xFF) == ord("s"):
                    cv2.destroyWindow("square")
            else:

                image = cv2.imread('triangle.png')
                cv2.imshow('triangle', image)
                key=cv2.waitKey(0)

                if (key & 0xFF) == ord("t"):
                    cv2.destroyWindow("triangle")

        def clear(self):
            self.c.delete('all')

        def putPoint(self, e):
            self.c.create_oval(e.x - self.bs, e.y - self.bs, e.x + self.bs, e.y + self.bs,
                               outline='black', fill='black')
            self.pre = [e.x, e.y]

        def paint(self, e):
            self.c.create_line(self.pre[0], self.pre[1], e.x, e.y, width=self.bs * 2,
                               fill='black', capstyle=ROUND,
                               smooth=TRUE)

            self.pre = [e.x, e.y]

    if __name__ == "__main__":
        root = Tk()
        main(root)
        root.title('Digit Classifier')
        root.resizable(0, 0)
        root.mainloop()
       # showing the prediction results in a UI
    return render_template("home1.html")

if __name__ == "__main__":
   # running the app
    app.run(debug=False)
```