Minor Project

Final Report

POSTURE DETECTION WEB APPLICATION

CSE 7th Semester

Guide - Dr. Naveen Aggarwal

Submitted by -

Uplav dang(UE193118)

Subham Sarkar(UE193108)

CERTIFICATE

I hereby certify that the work which is being submitted in this project work titled " Expense Tracker : POSTURE DETECTION WEB APPLICATION " in partial fulfilment of the requirement for the award of the degree of "Bachelor of Engineering in Computer Science and Engineering" submitted in UIET, Panjab University, Chandigarh, is an authentic record of my work carried out under the supervision of Dr.Naveen Agggarwal and refers to other researchers work which isduly listed in the reference section. The matter presented in this project work has not been submitted for the award of any other degree of this or any other university.

Uplav Dang(UE193118)

Subham Sarkar(UE193108)

This is to certify that the statements made above by the candidate are correct and true to the best of my knowledge.

Dr. Naveen Aggarwal
Professor CSE, UIET, Panjab University, Chandigarh –160014

VISION:

To be recognized as an international leader in Computer Science and Engineering education and research to benefit society globally.

MISSION:

- To move forward as frontiers of human knowledge to enrich the citizen, the nation, and the world.
- To excel in research and innovation that discovers new knowledge and enables new technologies and systems.
- To develop technocrats, entrepreneurs, and business leaders of future who will strive to improve the quality of human life.
- To create world class computing infrastructure for the enhancement of technical knowledge in field of Computer Science and Engineering.

PROGRAMME: B.E. CSE (UG PROGRAMME)

PROGRAMME EDUCATIONAL OBJECTIVES:

I. Graduates will work as software professional in industry of repute.
II. Graduates will pursue higher studies and research in engineering and management disciplines. III. Graduates will work as entrepreneurs by establishing startups to take up projects for societal and environmental cause.

PROGRAMME OUTCOMES:

A. Ability to effectively apply knowledge of computing, applied sciences and mathematics to computer science & engineering problems.

B. Identify, formulate, research literature, and analyze complex computer science & engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

C. Design solutions for computer science & engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

D. Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

E. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to different computer science & Engineering activities with an understanding of the limitations.

F. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

G. Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for the sustainable development.

H. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

I. Ability to function effectively as a member of a team assembled to undertake a common goal in multidisciplinary settings.

J. Ability to communicate effectively to both technical and non-technical audiences.

K. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

L. Recognition of the need for and the ability to engage in life-long learning. The ability to successfully pursue professional development.

COURSE OUTCOMES (CO):

1. Identify research and development oriented project based on problems of practical and theoretical interest
2. Explore, identify and use appropriate methodologies and tools for implementation of identified problem
3. Demonstrate solution at periodic intervals for suggestions and review
4. Write report outlining entire problem, including literature survey and various results obtained

ABSTRACT

Yoga aims at development of all-round personality, it is synchronization of mind, body and the spirit. Improper postures / in-correct way of doing Yoga can result in serious damage to one's physique and brain. In ancient time, it used to be performed only under the supervision of an accomplished Guru (teacher). In this busy world with time and place constraints, it is difficult to locate an accomplished Guru. Therefore, it is essential to adopt the right Yoga procedure at the very beginning. Deep Learning models can be trained to detect Yoga postures and be able to provide feedback / corrections if needed.. In this we have created a model which estimates a given human pose. We have compared the results obtained by the model for 2D points of the image and determined if adding more features to the dataset actually increases the accuracy of the model or not. Furthermore, we have put forward a simple neural network model that efficiently analyses the input image and conveys if the pose performed in the image is correct and then render those details into a web application written using Flask.

TABLE OF CONTENTS

INTRODUCTION

Posture Detection Web Application is a real-time pose detection technique with which you can detect human beings' poses in Image or Video. It works in as single-mode(single human pose detection). In simple words, it is a model that allows you to estimate human pose by detecting body parts such as elbows, hips, wrists, knees, ankles, and form a skeleton structure of your pose by joining these points.

AIM

Through the human body detection, computer interactive calculation, and the establishment of standard yoga poses, the posture recognition method based on the angle of the human joint points is improved, which can automatically collect and recognize the dance movements of the trainer. Evaluate the dance posture of the trainer in two aspects of the angle formed by the joints, and give an action comparison chart and guidance suggestions. The innovation of this paper is to use the combination of smart sensors and gesture recognition services and make full use of the advantages of smart sensors of the Internet of Things to give play to the construction and use of the gesture recognition service platform, thereby providing assistance to dance training and promoting the combined development of dance field and technology.

TOOLS & TECHNOLOGIES USED

- Python
- Flask
- HTML
- CSS
- Sqlite
- Sqlalchemy

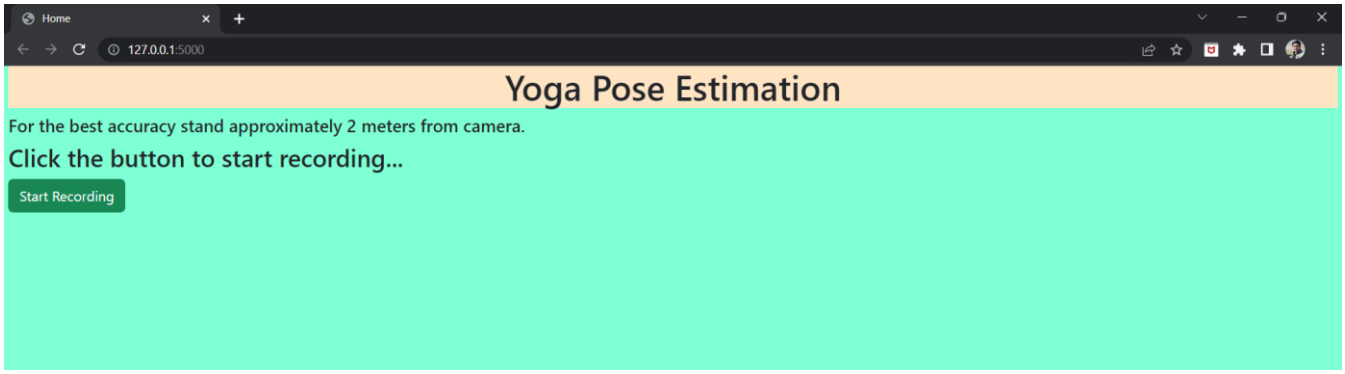
Libraries Used

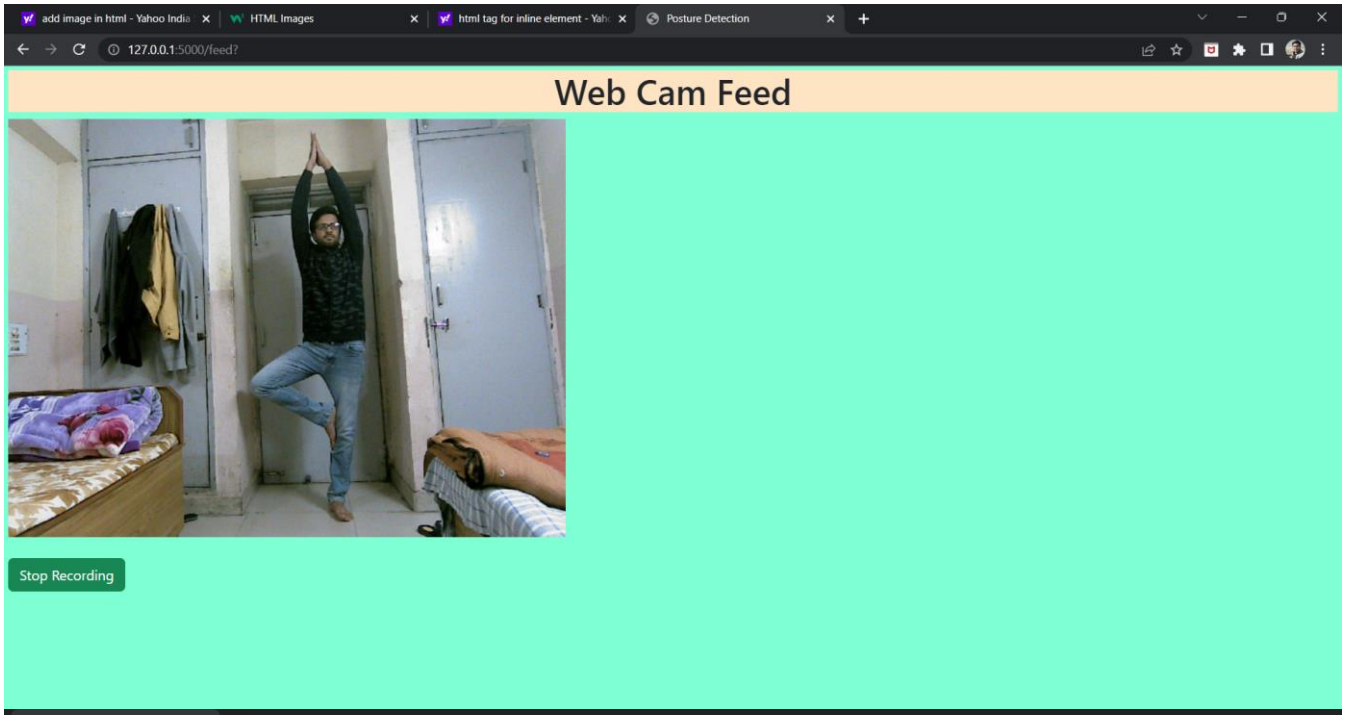
- Opencv
- Numpy
- Matpoltlib
- TensorFlow

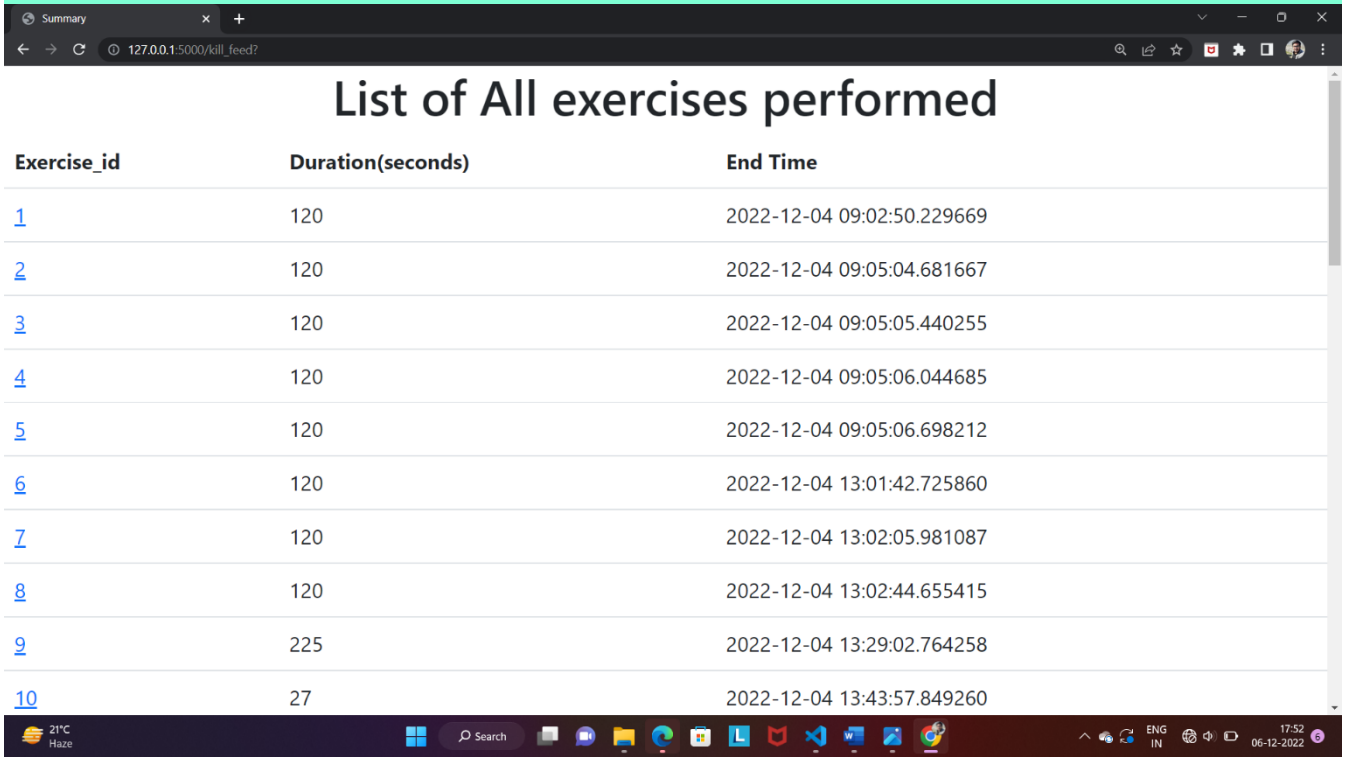
KEY FEATURES :

1. **Simplest way to detect yoga poses.**
2. **Very efficient and fast.**
3. **Very reliable and accurate(upto70-75%).**
4. **Keep track of the poses and the time duration.**
5. **Very simple to use and has a userfriendly interface.**
6. **Very flexible i.e can be trained to various other combinations.**

Screenshots showing UI and working of the app:

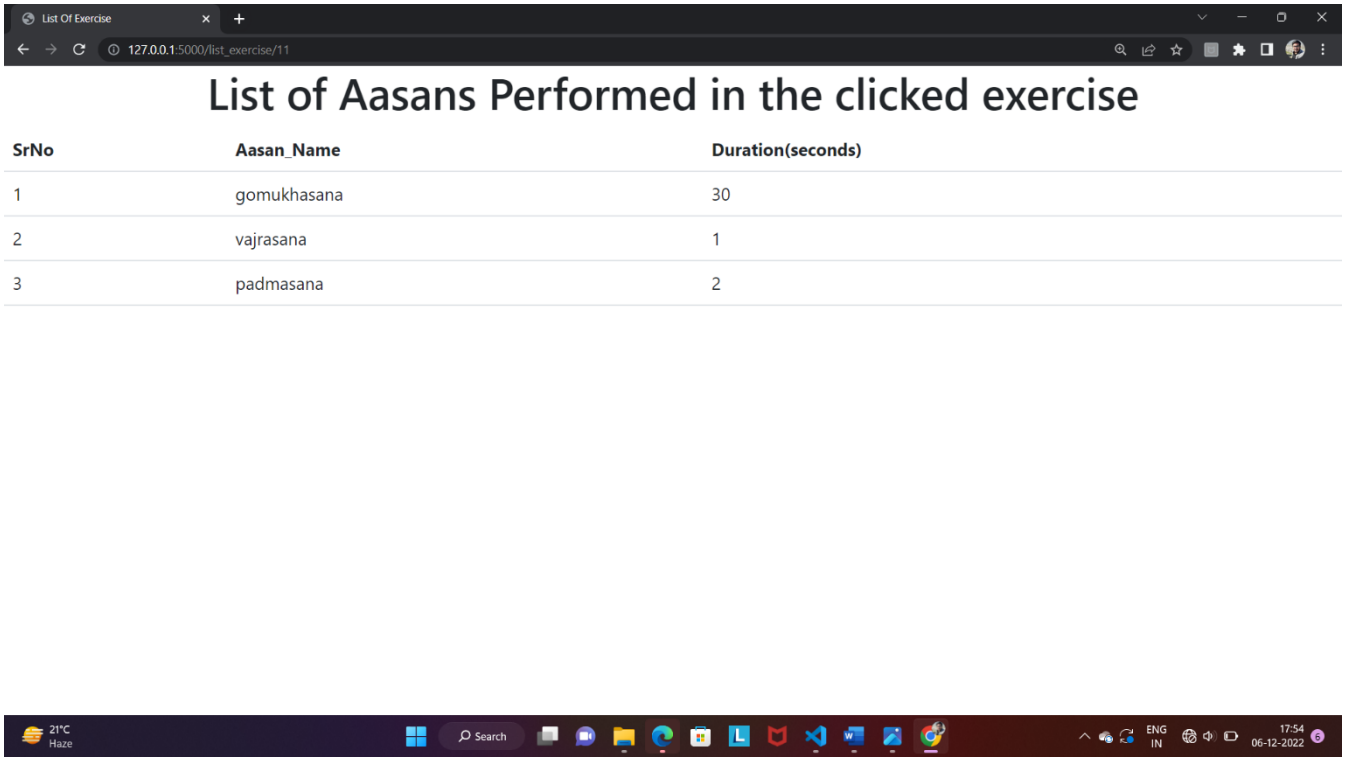




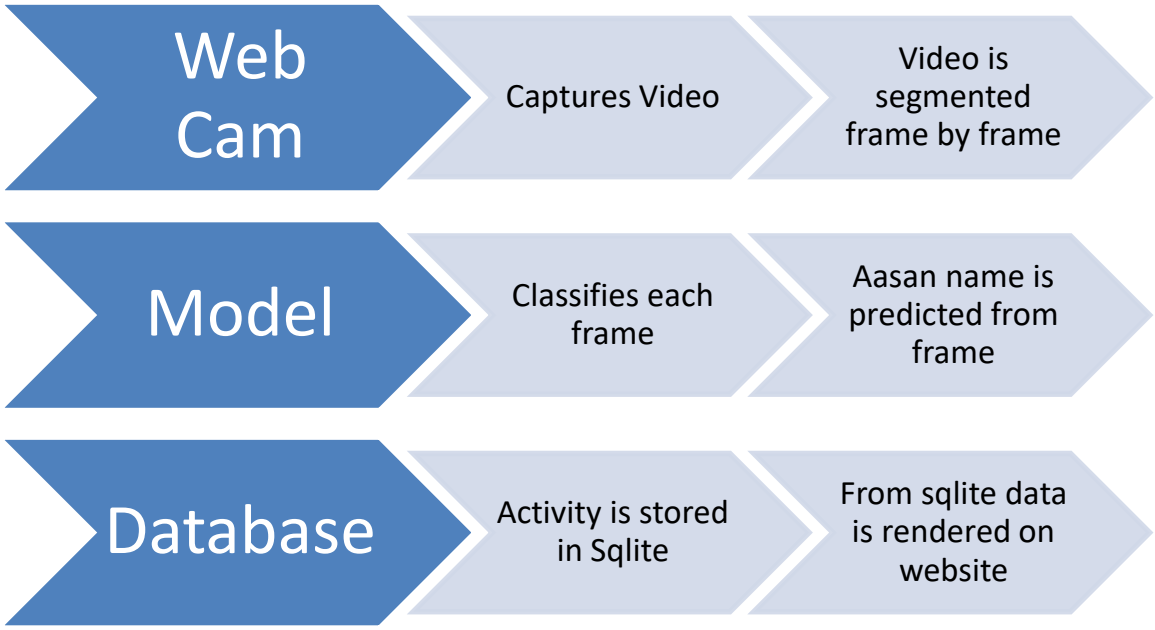


List of All exercises performed

Exercise_id	Duration(seconds)	End Time
1	120	2022-12-04 09:02:50.229669
2	120	2022-12-04 09:05:04.681667
3	120	2022-12-04 09:05:05.440255
4	120	2022-12-04 09:05:06.044685
5	120	2022-12-04 09:05:06.698212
6	120	2022-12-04 13:01:42.725860
7	120	2022-12-04 13:02:05.981087
8	120	2022-12-04 13:02:44.655415
9	225	2022-12-04 13:29:02.764258
10	27	2022-12-04 13:43:57.849260


List Of Exercise
127.0.0.1:5000/list_exercise/11
List of Aasans Performed in the clicked exercise
SrNo
Aasan_Name
Duration(seconds)
1
gomukhasana
30
2
vajrasana
1
3
padmasana
2
21°C
Haze
Search
ENG
IN
17:54
06-12-2022

Flow Of Data:



KEY POINTS

- Frame rate is 1 per second.
- Threshold Accuracy for determinig posture is set at 60%
- SqlAlchemy is used for connection between Sqlite and Flask.

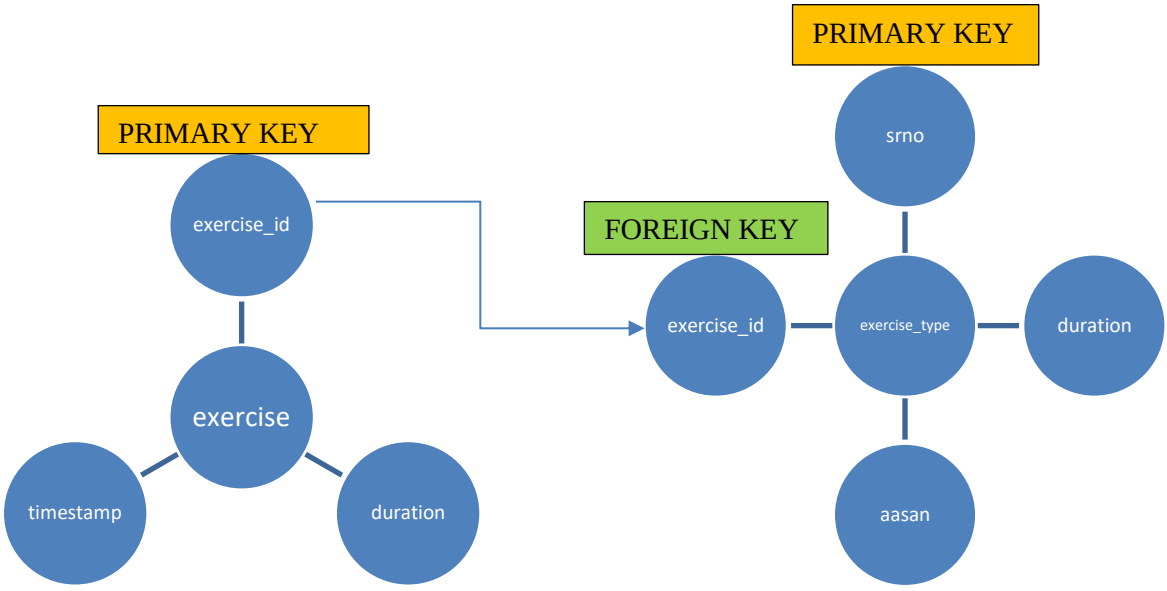
APP.PY

- **Route('/'): render ('home.html)**
- **Route('feed'): captures web cam feed and segment into frames**
- **Route('video'): passes each frame to model, predicts and stored to database**
- **Route('kill_feed'): Renders data from database to HTML table**

Templates:

- **Home.html**
- **Feed.html**
- **Summary.html**
- **List_of_exercise.html**

Database:



Model:

We had used a classifier model which classifies yoga aasans in the following categories:

Gomukhasana

Natrajasana

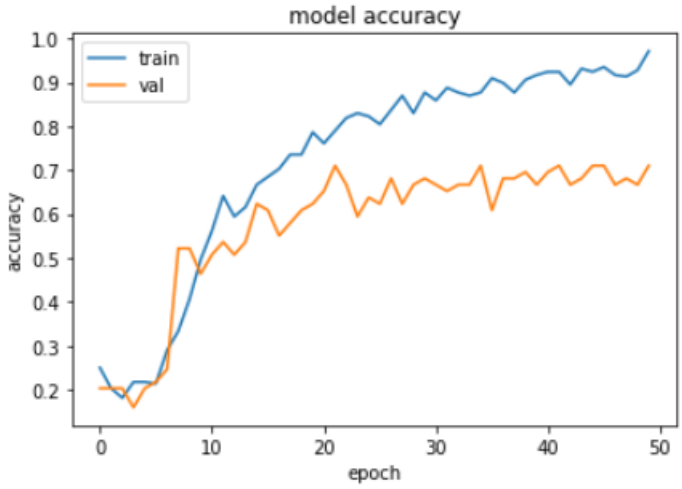
Padmasana

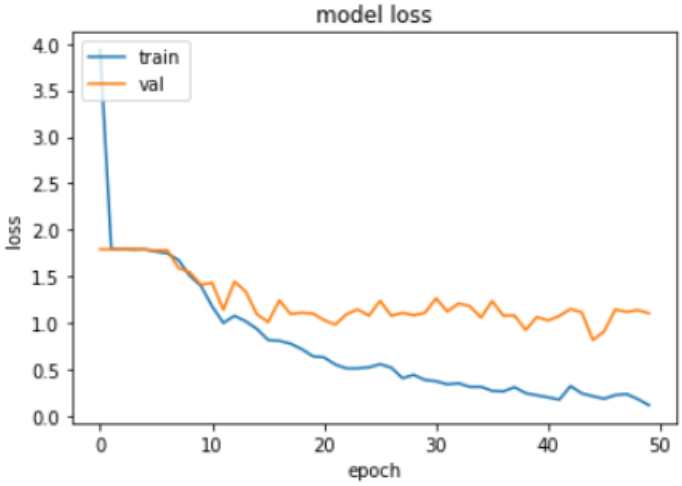
Tadasana

Vrikshasana

Model- Tensor Flow Keras

```
K.clear_session()
model = tf.keras.models.Sequential([
            tf.keras.Input(shape=(256,256,3)),

            tf.keras.layers.RandomFlip("horizontal"),
            tf.keras.layers.RandomRotation(0.1),
            Rescaling(1.0 / 255),

            Conv2D(32,(3,3),activation='relu'),
            MaxPooling2D((2,2)),
            Dropout(0.3),

            Conv2D(64,(3,3),activation='relu'),
            MaxPooling2D((2,2)),
            Dropout(0.3),

            Conv2D(64,(3,3),activation='relu'),
            MaxPooling2D((2,2)),
            Dropout(0.5),

            Flatten(),
            Dense(512,activation='relu'),
            Dense(128,activation='relu'),
            Dense(6,activation='softmax')

])
model.summary()
```





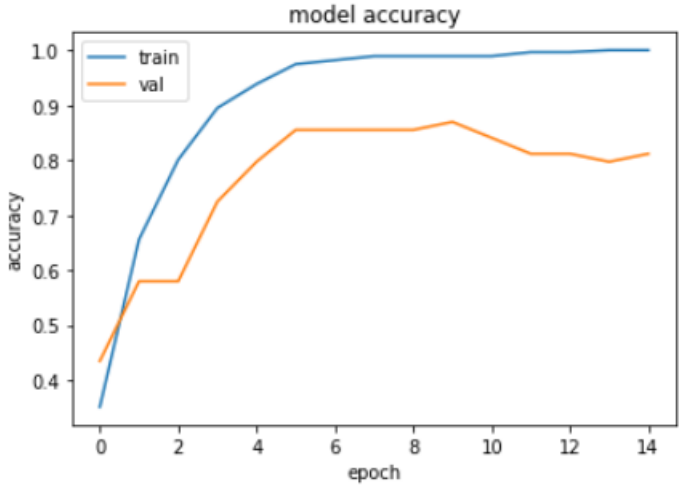
Results:

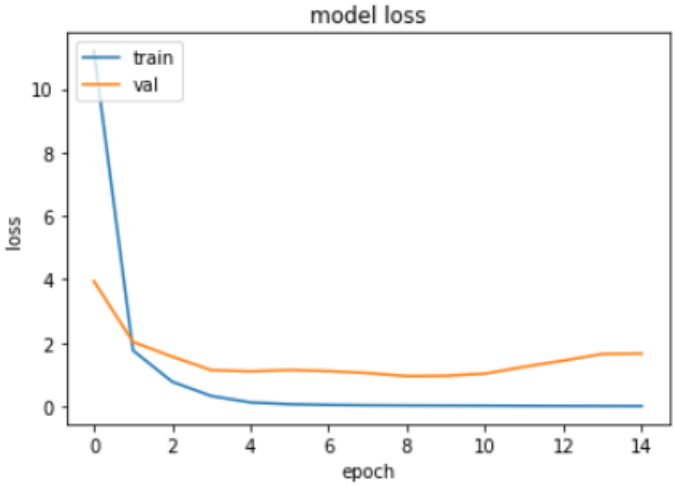
No of Epochs: 50
Accuracy: 82%

```
[13] score = model.evaluate(X_test, y_test, verbose=0)
     print("Test loss:", score[0])
     print("Test accuracy:", score[1])

     Test loss: 0.903832733631134
     Test accuracy: 0.8205128312110901
```

Using Transfer Learning

```
from tensorflow.keras.applications.vgg16 import VGG16
from tensorflow.keras.applications.vgg16 import preprocess_input

vgg_model = VGG16(weights="imagenet", include_top=False, input_shape=(256,256,3))
vgg_model.trainable = False

X_train = preprocess_input(X_train)
X_test = preprocess_input(X_test)
```





Results:

No of Epochs: 15/50

Accuracy: 89%

Conclusion :

With research and study we have successfully made the “POSTURE DETECTION WEB APPLICATION”, It is a real-time pose detection technique with which you can detect human beings’ poses in Image or Video. It works in single-mode(single human pose detection). In simple words, it is a model that allows you to estimate human pose by detecting body parts such as elbows, hips, wrists, knees, ankles, and form a skeleton structure of your pose by joining these points. It is a fluid application, which is made like a pipeline framework so that not one these postures are used to detect yoga poses but also some posture function by using a model which is trained according to the work assigned to it.

References:

1. **https://flask.palletsprojects.com/en/2.2.x/**
2. **https://www.sqlite.org/docs.html**
3. **https://docs.sqlalchemy.org/en/14/**
4. **https://stackoverflow.com/**
5. **https://www.kaggle.com/datasets/shrutisaxena/yoga-pose-image-classification-dataset**

Department of Computer Science and Engineering
UIET, Panjab University, Chandigarh

Course Exit Survey

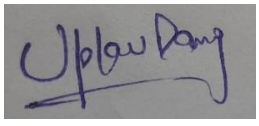
Dear Student

The attainment of course outcome after the completion of the course is required as it would help in the continuous improvement of Course Outcomes (CO). This course exit survey would enable us to know as to what extent the subject under consideration and the teaching methodology that have been practiced in the institution have contributed towards the attainment of course outcomes. Hence you are asked to provide the attainment level on scale of Very High (5), High (4), Medium(3), Satisfactory (2), Low (1) for the given course outcomes.

Name of the student: Uplav Dang **Roll No:** UE193118	**Year/Semester** 4th year/7th SEM	**Academic Year** 2021-2022 DEC - 2021
Course Name	Minor Project	
Mentor Name	Dr.Naveen Aggarwal	
Guide Name	Dr. Nirmal Kaur	

Course Outcomes		**Course Outcome Attainment**				
		Very High (5)	**High (4)**	**Medium (3)**	**Satisfactory (2)**	**Low (1)**
CO 1	Identify research and development oriented project based on problems of practical and theoretical interest	X	✓	X	X	X
CO 2	Explore, identify and use appropriate methodologies and tools for implementation of identified problem	X	✓	X	X	X
CO 3	Demonstrate solution at periodic intervals for suggestions and review	X	✓	X	X	X
CO 4	Write report outlining entire problem, including literature survey and various results obtained	X	✓	X	X	X

Suggestions for Improvement : No suggestions .



Signature of Student

Department of Computer Science and Engineering
UIET, Panjab University, Chandigarh

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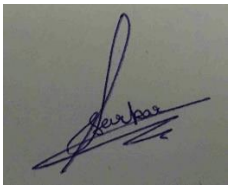
Name of the student: Subham Sarkar **Roll No:** UE193108	**Year/Semester** 4th year/7th SEM	**Academic Year** 2021-2022 DEC - 2021
Course Name	Minor Project	
Mentor Name	Dr. Naveen Aggarwal	
Guide Name	Dr. Nirmal Kaur	

Course Outcomes		**Course Outcome Attainment**				
		Very High (5)	**High (4)**	**Medium (3)**	**Satisfactory (2)**	**Low (1)**
CO 1	Identify research and development oriented project based on problems of practical and theoretical interest	X	✓	X	X	X
CO 2	Explore, identify and use appropriate methodologies and tools for implementation of identified problem	X	✓	X	X	X
CO 3	Demonstrate solution at periodic intervals for suggestions and review	X	✓	X	X	X
CO 4	Write report outlining entire problem, including literature survey and various results obtained	X	✓	X	X	X

Suggestions for Improvement : No suggestions .



Signature of Student