



SRI RAMACHANDRA

INSTITUTE OF HIGHER EDUCATION AND RESEARCH

(Category - I Deemed to be University) Porur, Chennai

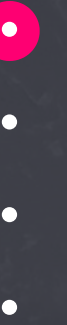
SRI RAMACHANDRA ENGINEERING AND TECHNOLOGY

CSE 310

CONTINUOUS ASSESSMENT - IV

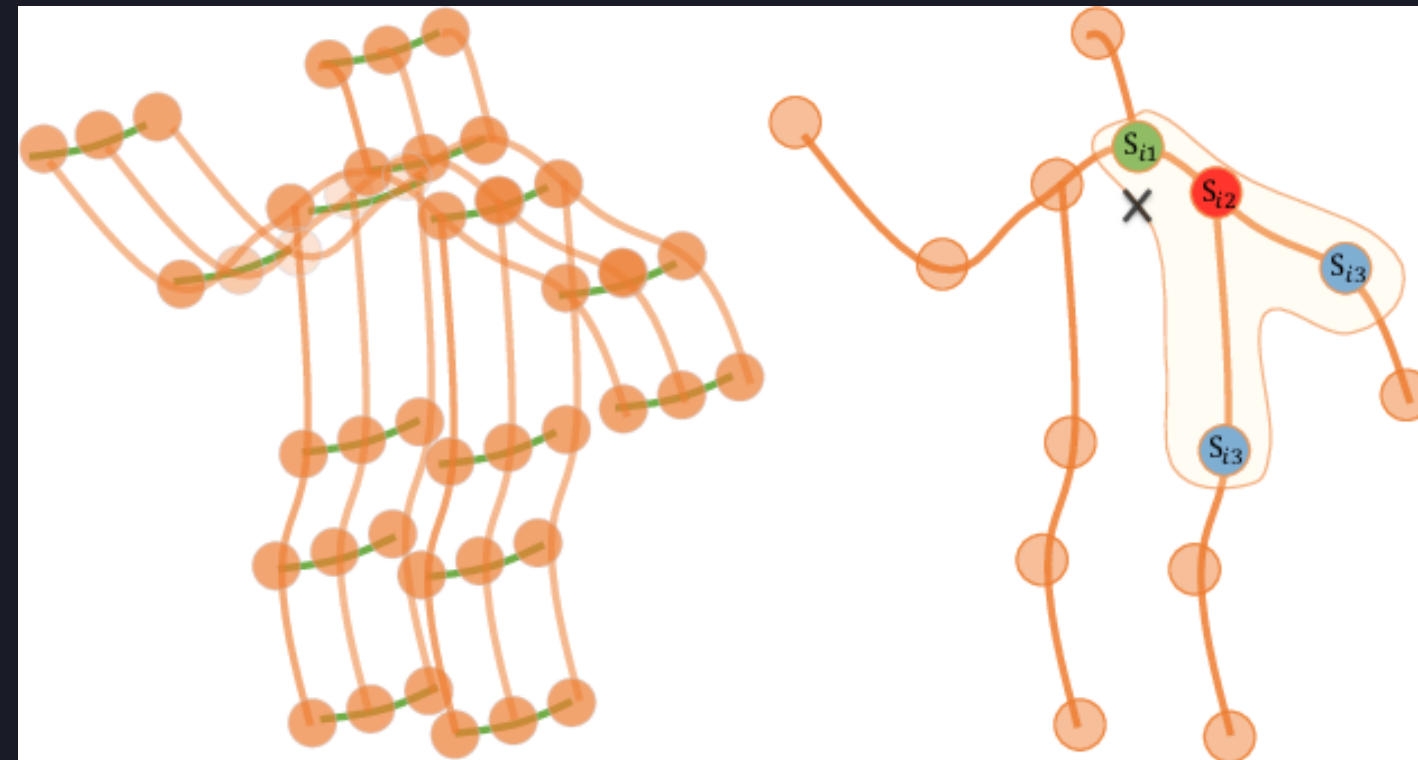
AI & ML

SKELETON BASED ACTION RECOGNITION



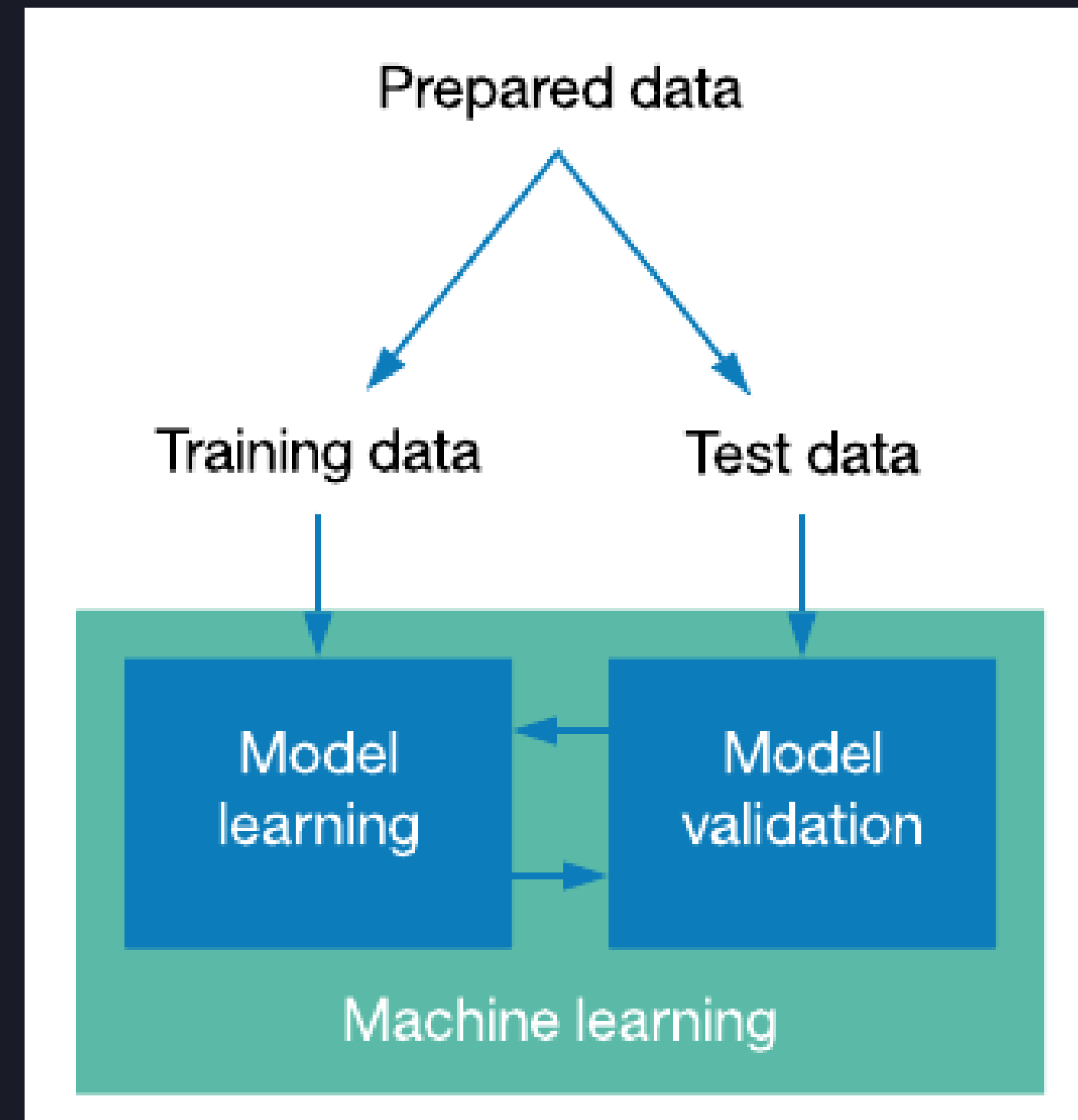
PROBLEM STATEMENT

To Develop and Evaluate a machine learning model for a 3D skeleton-based action recognition system using UTD MHAD dataset.



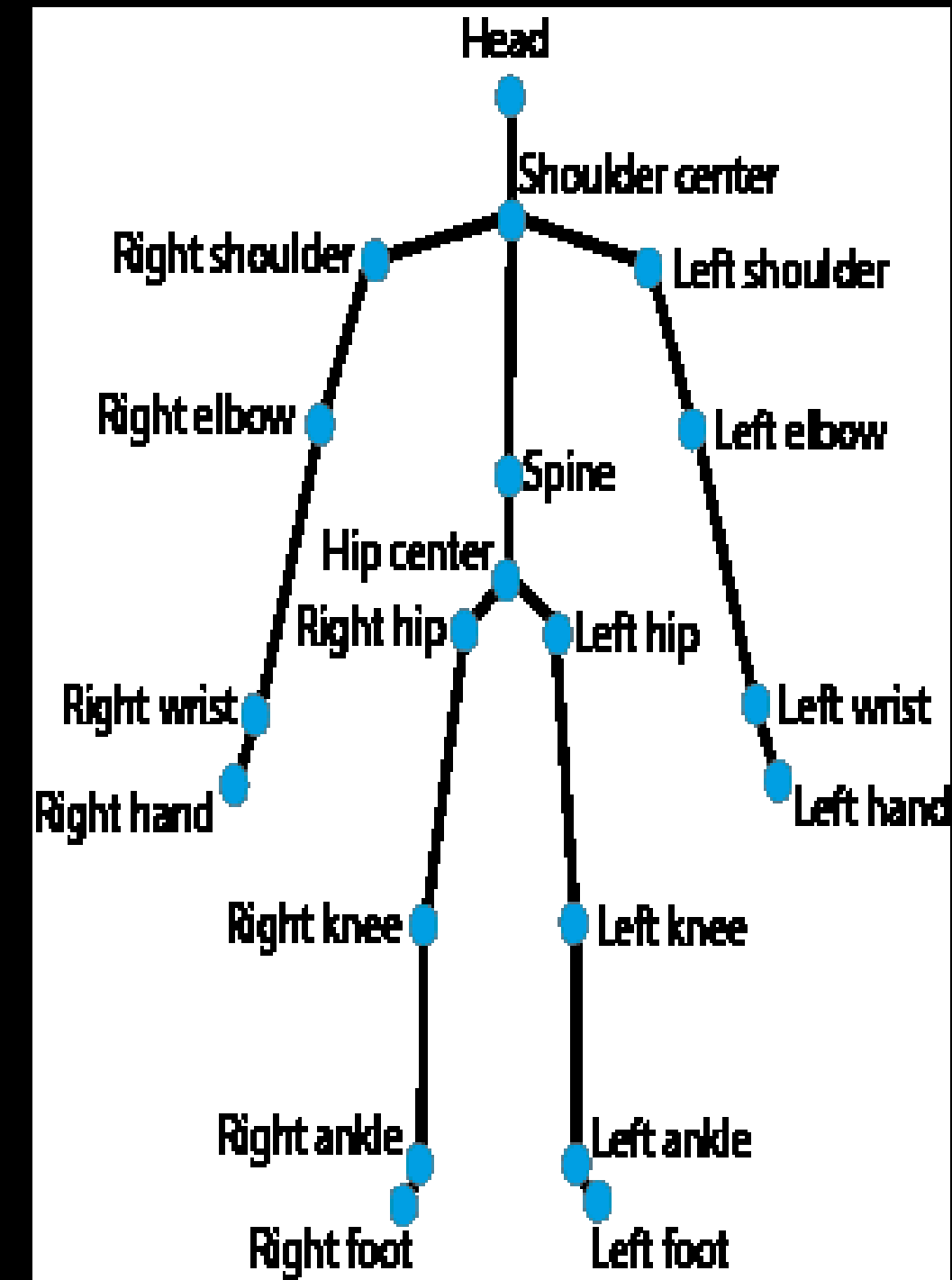
TRAIN – TEST SPLIT

- Even subjects S2, S4, S6 and S8 as Train data
- Odd subjects S1, S3, S5 and S7 as Test data



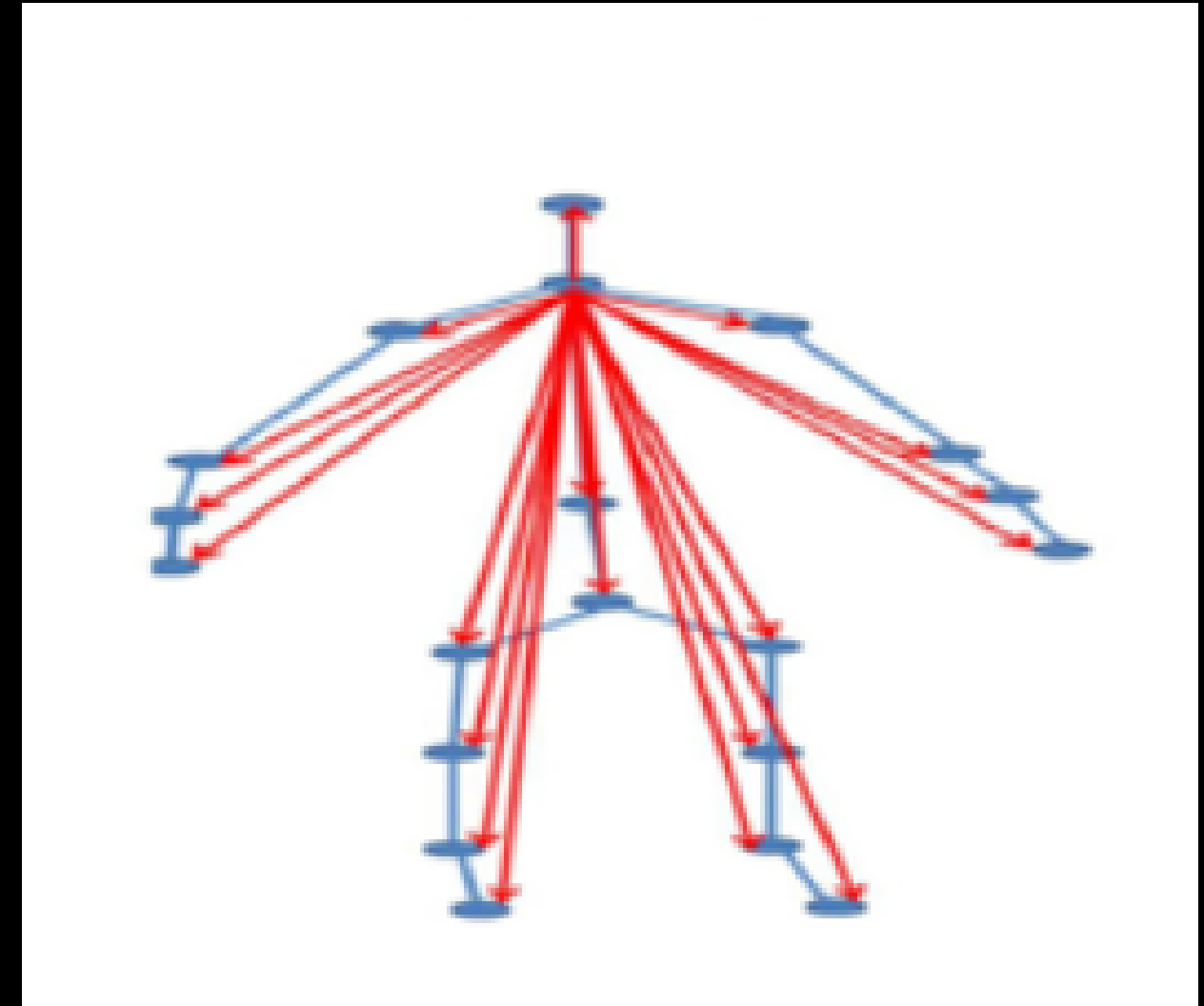
FEATURE EXTRACTION

To Calculate the Euclidean distance between Shoulder center joint to remaining all joints.



DISTANCE CALCULATION

Calculating the euclidean distance between the shoulder center point and all the points of the frame using lambda function



VARIABLE-LENGTH HANDLING STRATEGY

Calculating ratio of total no. of frames and minimum frames to get an interval after which each individual frames are selected for modelling

```
def trim(x,minvalue):  
    r = (x.shape[2]/(minvalue) )  
    array = []  
    t=0+r  
    i=int(t)  
    # print(x.shape[2])  
    while i+1 < x.shape[2]:  
        array.append( x[:, :,i] + ( (x[:, :,i] - x[:, :,i+1])*(t-i) ) )  
        t+=r  
        i=int(t)-1  
    return(np.array(array)[:40])  
#performed slicing operation to restrict size . Since  
few objects has output length to be 41
```

IMPLEMENTATION

1. Find the ratio of frames for current video's no of frames : minimum number of frames from the entire dataset.
2. Use Frame Interpolation to find the frames at equal distances for a total of 40 frames.

ADVANTAGES

Maintain consistency in the dataset

Entire Dataset is Preserved

Minimises the Loss of data

DISADVANTAGES

Synthetic Data

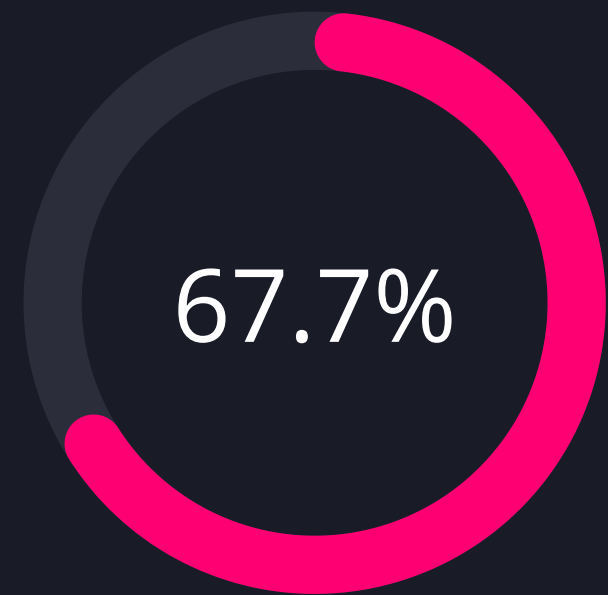
Increased Calculations

Hard To Implement

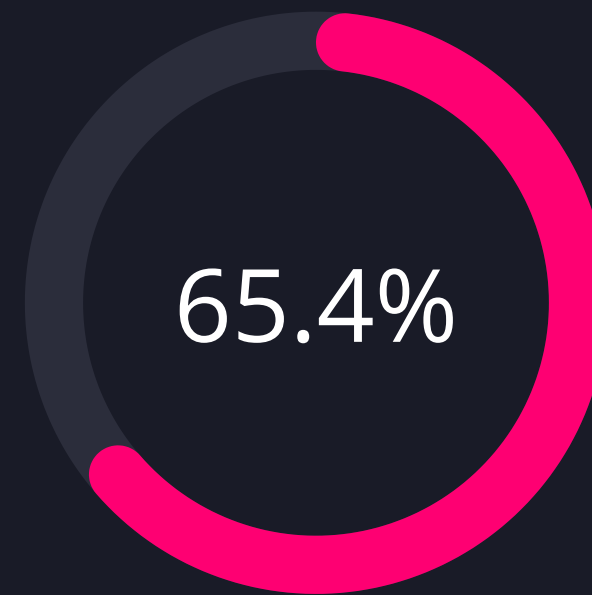
ML MODELS

- LOGISTIC REGRESSION
- LIGHTGBM
- XGBOOST
- DECISION TREE
- EXTRA TREE
- KNN
- GAUSSIAN NB
- MULTINOMIAL NB

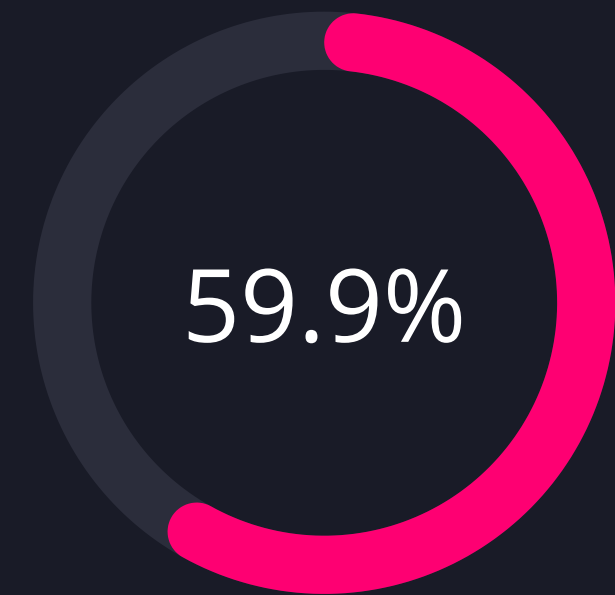
COMPARING THE ACCURACY



LOGISTIC REGRESSION

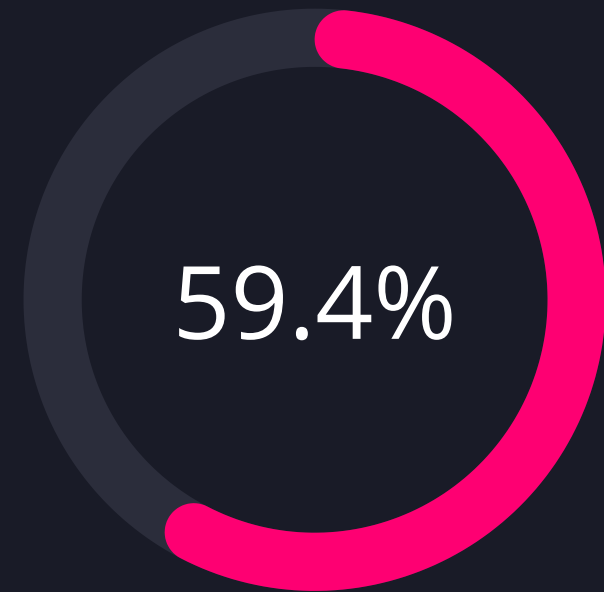


EXTRA TREES CLASSIFIER

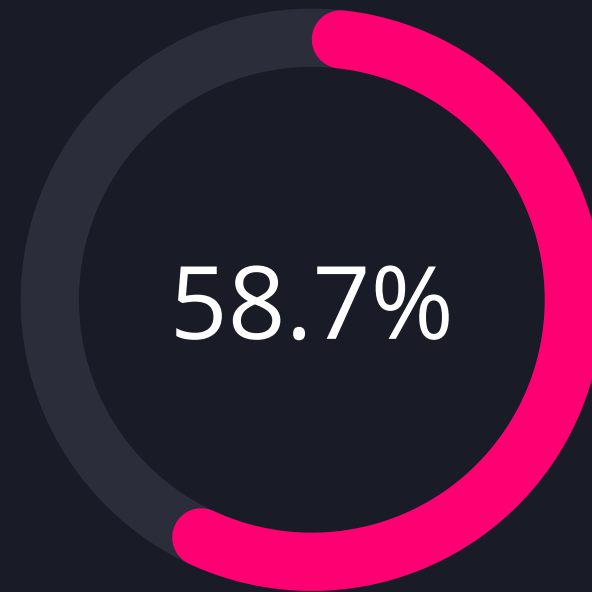


KNN CLUSTERING

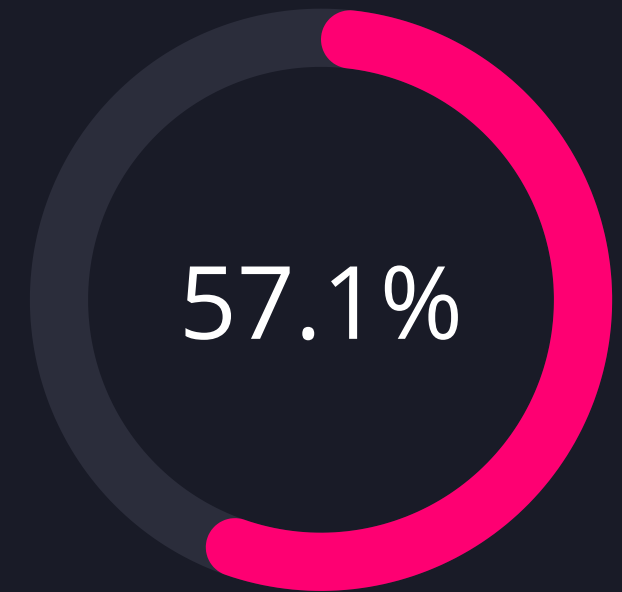
COMPARING THE ACCURACY



LIGHTGBM CLASSIFIER

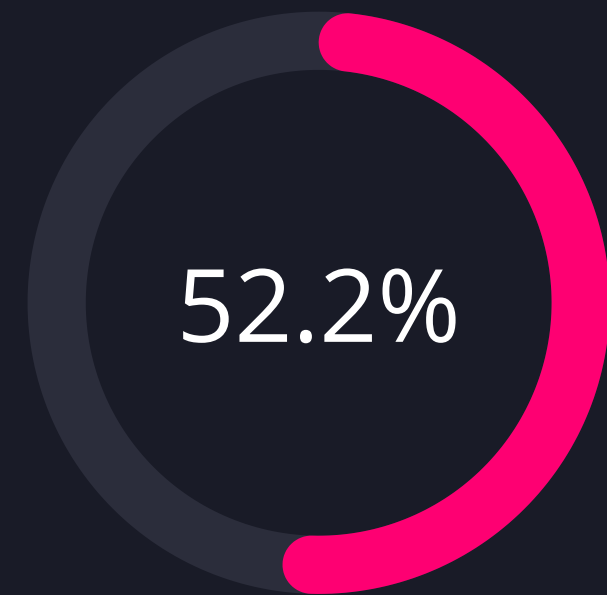


MULTINOMIAL NB

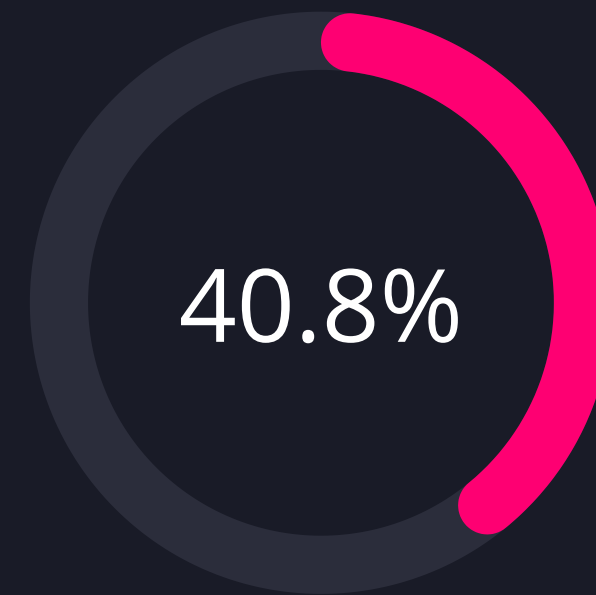


GAUSSIAN NB

COMPARING THE ACCURACY



XGBOOST CLASSIFIER



DECISION TREE

CONCLUSION

Skeleton based action recognition is successfully implemented using data preprocessing techniques for feature extraction by converting all the d_skel data stored in the .mat files into 1-D array and finally building classification models using machine learning techniques.

REFERENCES

- <https://www.sciencedirect.com/topics/computer-science/logistic-regression>
- <https://medium.com/@pushkarmandot/https-medium-com-pushkarmandot-what-is-lightgbm-how-to-implement-it-how-to-fine-tune-the-parameters-60347819b7fc>
- <https://towardsdatascience.com/https-medium-com-vishalmorde-xgboost-algorithm-long-she-may-rein-edd9f99be63d>