YogaPartner

Group 5

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What is YogaPartner?

Yoga Partner is an android application which assists people while doing yoga.

Using phone’s camera, the posture of the user is captured. The posture is interpreted by the application in the form of landmarks. The specific yoga asana that is demonstrated by the user is found out by the software using a ML algorithm. The name of the asana is then displayed on the screen.

Why YogaPartner?

- User friendly design.
- Ease of use.
- Identify yoga asana.
- Identify using phone camera.
- No need of personal trainer.

Poster

INTRODUCTION

Yoga is popular around the world. It began as a spiritual practice but has become popular as a way of promoting physical and mental well-being. A lot of people are participating in it by themselves through watching the TV/videos or teaching each other. However, it is not easy for novice people to properly study, practice and understand Yoga poses by themselves. We propose a Yoga Asana assessment method using pose classification to help the self-learning of Yoga. The system first detects a pose using the phone camera. Then, it finds the asana that the user is doing.
This involves a detection phase then a classification phase.

We trained it on a large dataset, which consists of 10 asanas and close to 2000 samples.

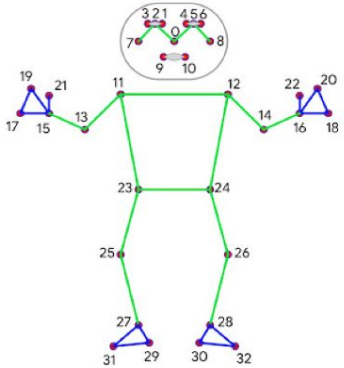
AIM

Asana classification is the task of identifying an already detected pose as a known yoga asana. The suitable real world applications for pose classification is with yoga asanas, workout tracking and other fitness actiivities, dance and full-body gesture control. Among the other options like 3d body scanning with sensors, this may not be as reliable or accurate but it has several advantages over the others: it is natural, easy to use, can be used with existing hardware (phone camera), less expensive and is faster for real time tracking.

METHOD

1. First, takes frames from the camera for processing. The frames are then sent to the processor for finding the pose starting the pipeline.

2. The detected pose consists of 33 landmarks in the human body. The in frame likelihood is considered to choose whether to proceed with the pipleline or if no confident pose was detected.



3. On finding a confident pose, we can extract features such as the length between joints and torso size. We are extracting 23 such features to use for yoga asana classification.

4. After the features are extracted, we are classifying the unique features of that pose to a yoga asana. We are classifying to 10 yoga asanas.

Utkata Konasana

CONCLUSION

The computational models, which were implemented in this project, were chosen after extensive research. This system was tested under robust conditions in this study and it is envisaged that real-world performance will be far more accurate. The yoga asana classification was found to have sufficient accuracy. The future with such fast and accurate systems is bright with multiple real world applications as stated in the introduction. With the non-requirement of expensive special hardware or sensors, adoption and success of such projects are way more probable. Everyone has a mobile device and mobile apps are the future, thus domain problems like these are much easier to tackle with. They give an insight into what the future may hold in computer vision.

REFERENCE

1. Deepak Kumar and Anurag Sinha, **Yoga Pose Detection and Classification Using Deep Learning**, International Journal of Scientific Research in Computer Science, Engineering and Information Technology, November 2020.

2. Valentin Bazarevsky and Ivan Grishchenko, **On-device, Real-time Body Pose Tracking with MediaPipe BlazePose**, Google, August 2020.

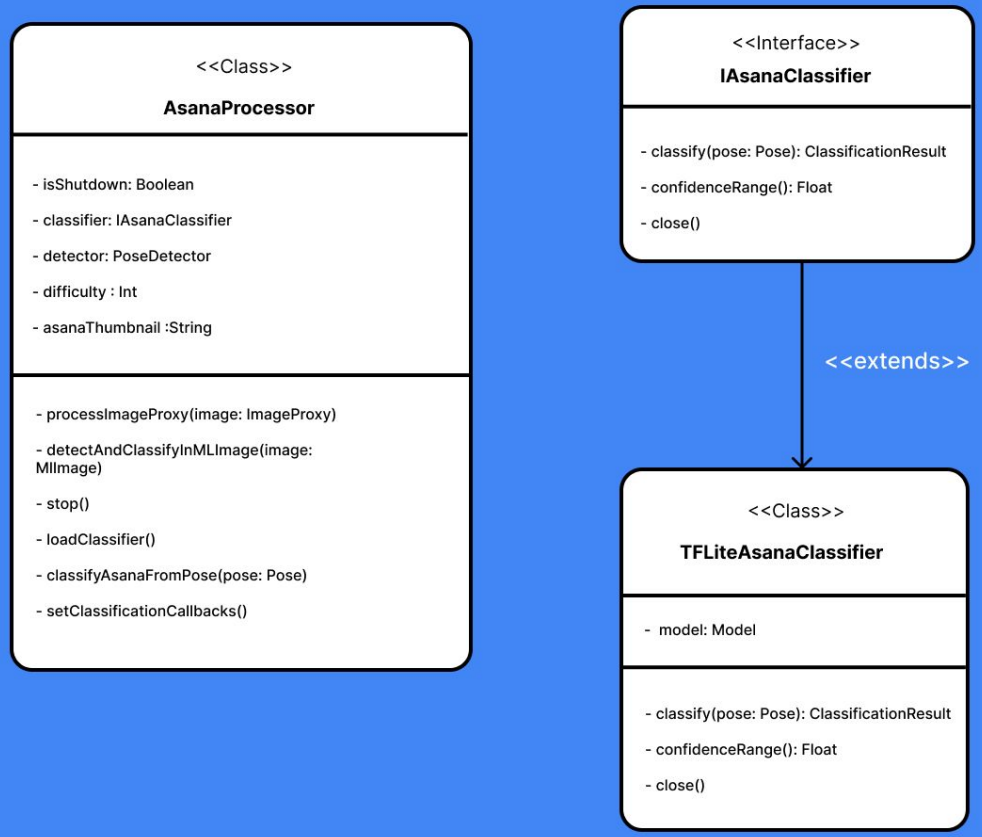
3. Rui Zhang and Zheng Zhu, **Exploiting Offset-guided Network for Pose Estimation and Tracking**, Beijing Key Laboratory of Network System Architecture and Convergence, 2017.

4. Vivek Anand Thoutam, Anugrah Srivastava, **Yoga Pose Estimation and Feedback Generation Using Deep Learning**, MIIT Mandalay, Myanmar 2020.

5. Manisha Verma and Sudhakar Kumawat, **Yoga-82: A New Dataset for Fine-grained Classification of Human Poses**, Osaka University, Japan Indian Institute of Technology Gandhinagar, India, 2020.

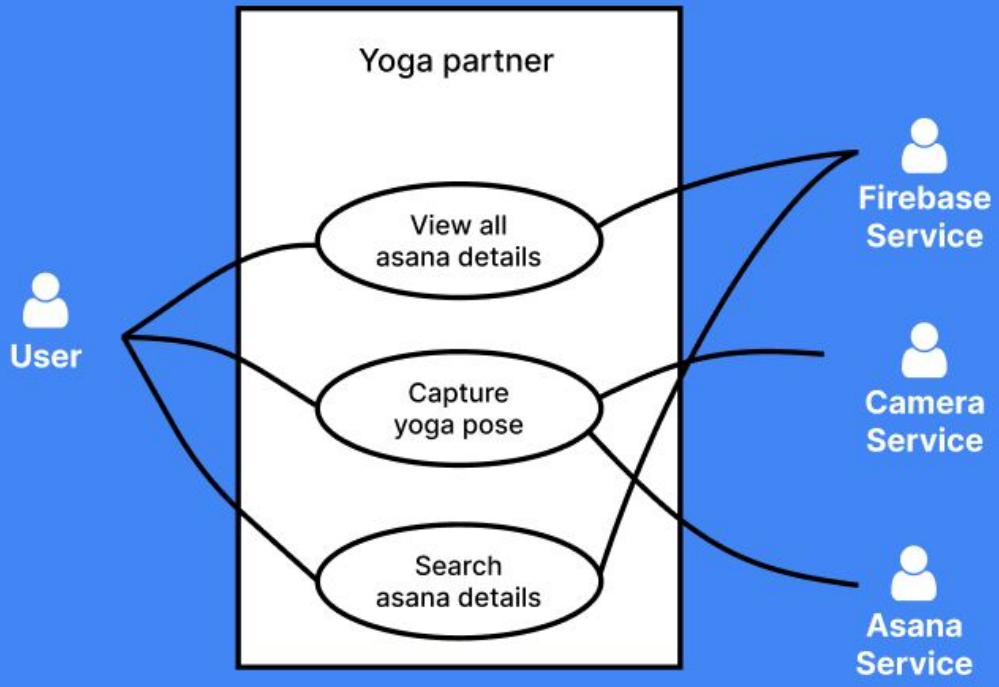
UML Models

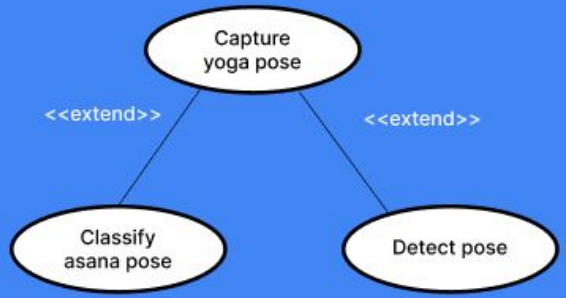
Class Diagrams




<<Class>>
Asana
- id : String
- name :String
- description : String
- difficulty : Int
- asanaThumbnail :String
- getFromDbValue(document)
- getFromDbList(documentList)
<<Class>>
ClassificationResult
- classConfidences: Map<AsanaClass, Float>
- getClassConfidence(asanaClass: AsanaClass)
- getMaxConfidenceClass()
- putClassConfidence(asanaClass: AsanaClass, confidence: Float)
<<Class>>
PoseEmbeddingUtils
- TORSO_MULTIPLIER: Float
- getPoseEmbedding(landmarks: List<PointF3D>)
- normalize(landmarks: List<PointF3D>): List<PointF3D>
- getPoseSize(landmarks: List<PointF3D>): Float
- getEmbedding(lm: List<PointF3D>): List<PointF3D>
- isImportantLandMark(landmarkType: Int)
<<Class>>
PoseWithAsanaClassification
- pose: Pose
- classification: Classification
<<Class>>
PointF3DUtils
- subtract(b: PointF3D, a: PointF3D): PointF3D
- multiply(a: PointF3D, multiple: Float): PointF3D
- average(a: PointF3D, b: PointF3D): PointF3D
- l2Norm2D(point: PointF3D)
- subtractAll(p: PointF3D, pointsList: List<PointF3D>)
- multiplyAll(pointsList: List<PointF3D>, multiple: Float)
<<Class>>
Classification
- asanaClass: AsanaClass
- confidence: Float

Use Case Diagrams





Future Works

Following are the features to be implemented in YogaPartner in near future

- Extending the number of yoga poses that are detected.
- Adding favourites.
- Adding option to also classify static images.
- Help user more to learn poses.
- Milestones.

Result

All the modules are complete and testing was performed successfully.

References

1. Deepak Kumar and Anurag Sinha, “Yoga Pose Detection and Classification Using Deep Learning”, International Journal of Scientific Research in Computer Science, Engineering and Information Technology, November 2020.

2. Valentin Bazarevsky and Ivan Grishchenko, “On-device, Real-time Body Pose Tracking with MediaPipe BlazePose”, Valentin Bazarevsky and Ivan Grishchenko, August 2020.

3. Rui Zhang and Zheng Zhu, “Exploiting Offset-guided Network for Pose Estimation and Tracking”,Beijing Key Laboratory of Network System Architecture and Convergence, 2017.

4. Vivek Anand Thoutam,1 Anugrah Srivastava, “Yoga Pose Estimation and Feedback Generation Using Deep Learning”, MIIT, Mandalay, Myanmar 2020.

5. Manisha Verma and Sudhakar Kumawat, “Yoga-82: A New Dataset for Fine-grained Classification of Human Poses”, Osaka University, Japan Indian Institute of Technology Gandhinagar, India, 2020.

Thank You