

Image and Video Datasets for Yoga Pose Estimation: A Review

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Abstract- Research and experimentation in various technical and scientific fields are based on benchmark datasets. Specifically in the field of deep learning, finding a high-quality dataset is a must for developing the model of any AI application. Dataset is an integral part of the field of deep learning as learning of the model depends on the quantity, quality, and relevancy of the dataset. In this paper, we present the literature review and summarized comparison of the different existing Yoga Pose datasets available publically for research and experiment. The purpose of this study is to help researchers to identify and select an appropriate yoga posture dataset for yoga pose recognition under human pose estimation using deep learning and machine learning technology.

Keywords-dataset, Yoga pose, deep learning, machine learning, Human pose estimation, Activity recognition.

I. INTRODUCTION

A dataset is a collection of data for a subject that is used to train the deep and machine learning model. it may be in the form of images, audio, videos, text, csv, spreadsheet etc. A dataset acts as an example to teach the learning algorithm how to make predictions. Human Pose estimation is a sub-field of computer vision that concerns itself with recognizing individual parts that make up a Human body [1]It is the important field of research with emergence of the deep learning, the key success of the deep learning solution depends on the dataset. Human pose estimation is also playing a vital role in healthcare, and Yoga is an ancient science becoming more popular and essential part of the healthcare. Most recently, with the proliferation of Covid-19, yoga has emerged into the mainstream as a way to promotes the integration of the mind, body and soul[1].

It elevates the quality of life and promotes health and harmony in society[2]The popularity of the yoga attracting the researchers and developers to provide the AI-solutions for yoga applications. Self learning of the yoga asana is one of the challenge as the wrong practice may harmful for the health so deep learning based systems may be the solutions for the self practice that why it is open field for research and innovation. The large scale dataset of the relevant subject is the key component in the Machine and deep learning to train the model. Creation of the new dataset is time taking and complex process so many researchers prefer to access the publically available datasets. So finding the right dataset is the challenging task in the deep learning, so this paper, help the researcher to opt the right yoga pose dataset.

To execute the literature survey we have reviewed the research papers worked on yoga postures classification and dataset repositories like Kaggle Datasets, UCI Machine Learning Repository, Datasets via AWS, Google's Dataset Search Engine, Microsoft Datasets, Awesome Public Dataset Collection, Computer Vision Datasets, Scikit-learn dataset and other dataset repositories and also search the dataset used in research papers using different suitable keywords on search engines. We downloaded the publically available datasets and analyses them to provide details and comparison of dataset for further researchers. We have also provided the links(table 3) of all datasets available publically to save the time for aspirants. We have excluded the datasets that are not provided publicly[4,5] by the researcher or link of source is expired[6].

We have explored all publicly available yoga pose dataset up to date with their details and how can be accessed. In survey we have found datasets in the form of images and videos so both of datasets are reviewed in Section-2 and Section-3 respectively.

II. IMAGE YOGA POSE DATASETS

Image datasets contain the images of the yoga poses. Images datasets of yoga having the images of finished pose. All dataset are listed here which can be accessed publicly.

1. Yoga-82

Yoga-82[7], is a yoga posture dataset for large-scale yoga pose recognition with 82 classes. Yoga-82 consists the yoga pose images from various internet sources, images have poses from different camera view angles and having the random background. The number of images varying in

each class from 64 to 1133 with an average of 347 images per class and the total of 28.4K images. There are 82 yoga pose classes in the dataset. Dataset is classified in 6 category of the asana Standing, sitting, balancing, Inverted Reclining and Wheel and in turn 20 subcategory. It provides hierarchical labels for yoga poses based on the body configuration of the pose. The dataset contains a three-level hierarchy including body positions, variations in body positions, and the actual pose names. The data is split in test and train with 21009 and 7469 no. of images respectively. Yoga-82 is the most challenging database available till date for Yogasana classification and used by many researchers but the authors have provided the links to download each image, some of links are not reachable. they provided train and test text files with labeling.

2. Yoga Pose Dataset

Goyal, S., & Jain, A. [8] propose a method, that allows real-time pose estimation to detect the error in yoga pose, they used the Yoga Pose dataset[9] created by the Niharika Pandit. The dataset contain the images of 5 yoga poses are dog pose, goddess pose, tree pose, plank pose and the warrior pose2. Total no. of images are 1561 and it is spit in train and test with 1091 and 470 no. of images respectively. No of images in each folder of pose is not equal. The images are downloaded from internet with different back ground ,with male and female actor both. Few images only contain sketch, silhouette, and drawing version of yoga poses but some images are containing water marks and text. Other researcher [10] also used this dataset for Yoga Pose Detection and Correction using Posenet and KNN.

3. Yoga Pose Image classification dataset

Yoga Pose Image classification dataset[11] is one of the large image dataset of yoga pose publically available. Shruti Saxena created this dataset with 107 different yoga poses and stored images in separate folders for each yoga pose. The images were taken from the web and seems like images in Yoga Posture Dataset[9] but having the large no. of images and covered 107 yoga poses, no other yoga dataset has covered such no. of asana with 6k no. of images. Each folder have the random no. of images in folders. This dataset has been downloaded from the repository more than 2.7k times that shown the interest of researchers and developers. But we have found some wrong pose images in the folder of the different pose, so there is minor classification issue in few folders, apart from this, it is good yoga pose image dataset.

4. New Dataset for Yoga Pose Classification

Laurence Moroney proposed New Dataset for Yoga Pose Classification[12]Numerous 300x300 images of five various yoga poses—Cobra Pose, Tree Pose,, Chair Pose, Downward Dog Pose and Warrior pose, can be found in this dataset. all images are created using Daz3D. There are a range of backgrounds, male and female models with varied skin and hair tones, camera angles, and lighting

settings. It's a difficult dataset to build a classifier with, but maybe it will be a helpful substitute for the typical routine datasets. Instead of just focusing on the end position, it also has numerous frames of the model entering and exiting the pose, allowing you to construct a classifier if you so choose to categories the various stages. This dataset is the good option for when intermediate steps are to be considered as it covered the various stages of a pose but it only included 5 poses. The data is divided into train and test; in test, 1000 images are organized into 5 folders, with 200 images for each yoga posture; in train, 495 images are organized into 5 folders with a random number of images in each folder. Therefore, this dataset has 1495 photos in 5 poses.

5. Yoga Posture Dataset

Yoga Posture Dataset[13] is an image dataset of 47 different yoga poses. Author stored images in 47 folders one for each yoga pose with random no. of images. Mrinal Tyagi created this data set manually using Google images with 2756 no. of images and also provided Poses.json file consists of English, and Sanskrit names as well as the URL for the logo of that pose. As the images are downloaded from internet so having text and watermarks and some of them are drawing images of yoga poses. Dataset has been used by few people for yoga detection and classification.

Table.1 Comparison of the publically available yoga pose image dataset

Sr.No	Dataset	Year	No. of Asana	No. of Images	Source
1	Yoga-82[7]	2020	83	28400	Internet
2	Yoga Pose Dataset[8]	2020	5	1561	Internet
3	Yoga Pose Image classification dataset[11]	2021	107	6000	Internet
4	New Dataset for Yoga Pose Classification[12]	2021	5	1495	Daz3D
5	Yoga Posture Dataset[13]	2022	47	2756	Internet

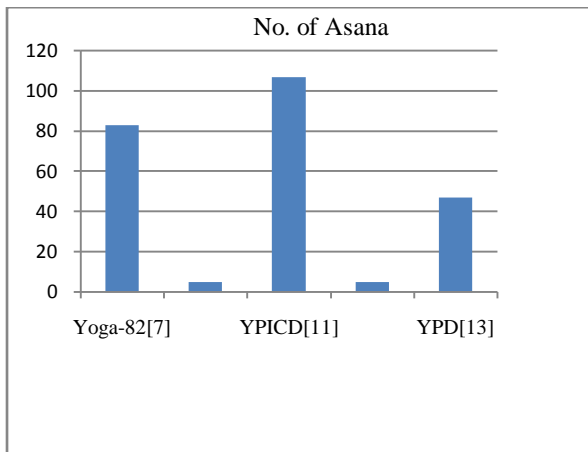


Figure 1: Graphical representation of comparison on no. asanas in different datasets

All five image datasets for yoga poses are found during our depth search and these are only yoga datasets available publicly as per our best review. Table 1 represent the summarized comparison between these datasets in terms of the no. of asana, no. of images etc. and same can be represented graphically in figure 1 and figure 2.

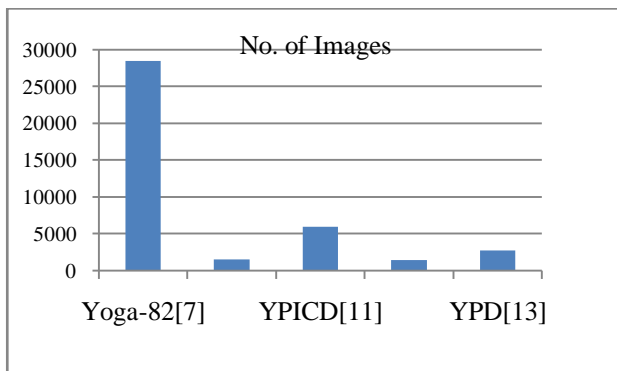


Figure 2: Graphical representation of comparison on no. images in different yoga datasets.

III. VIDEO YOGA POSE DATASETS

A yoga asana is an activity as having the no. of steps to reach in the finished pose and same for coming back. So few researcher taken yoga pose as an activity and created the videos of the asana. We have found only two publicly available video datasets for yoga activity recognition.

1.Yadav et al. [14] proposed a yoga video dataset of six asanas includes Padmasana, Tadasana, Trikonasana, Shavasana and Vrikshasana to develop a yoga recognition system. The dataset was created with ten males and five females total 15 participants using normal RGB webcam and they made publicly available at <https://archive.org/details/YogaVidCollected>. All participant perform all 6- asanas in common indoor

environment. This dataset contains 88 total no. of videos with single view recorded at 30 fps.

Table.2: Comparison of the publically available yoga pose video dataset for yoga action recognition

Sr. No	Dataset	Year	Asanas	Participant	No. of Videos	Duration	Shooting Location	Side
1	SKYadav[14]	2019	6	15	88	18-65 sec	Static	front
2	In-house dataset[15]	2020	10	27	261	5-15 sec.	multiple	front

The length of the videos are random but as analyze the average length is approx 45 sec. They have recorded the videos with steps of finished pose and coming back to the starting position. As per our survey this is the first yoga pose video dataset available publicly. All 88 videos are stored in a single folder with the labeling of 'PersonName_AsanaName'. They have created this dataset in the form of videos as yoga asana is an activity. Major publicly available yoga pose datasets[7,9,11,12,13] are image datasets having the images of finished yoga pose. So for yoga asana as activity recognition ,it is the good dataset but not at large scale.

2. In-house Yoga

Jain et al. [15] proposed 3D-CNN inspired deep learning architecture for yoga pose recognition and they have prepared a in-house Yoga pose video dataset consisting of ten Yoga poses includes Ananda Balasana, Anjaneyasana, Dandasana, Kumbhakasana, HastaUttanasana, Janu Sirsasana, Malasana, Paschimottanasana, Tadasana and Uttanasana. Yoga videos were recorded using Smartphone camera with both 1080p and 4k resolution at 30 fps and 27 people contributed to the creation of the yoga pose dataset (19 females and 8 males).

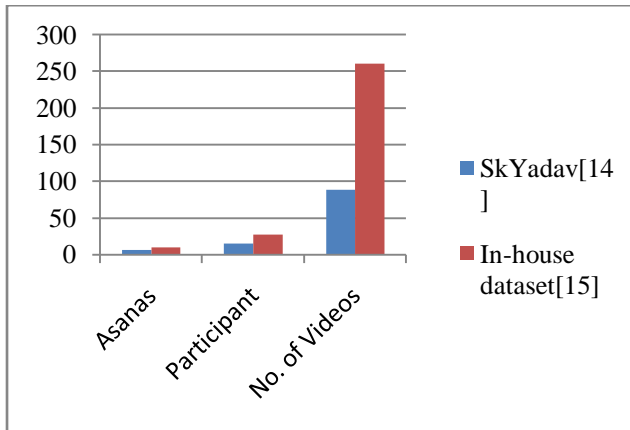


Figure 3: Graphical representation of comparison on no. asanas and participants in different yoga video dataset

Participants are not yoga experts, seems very basic knowledge of asanas as they performed and the mountain pose performed wrongly. The approx length of the video is between 5 to 15 sec. Videos are recorded front view of the participant in different environment like garden, room, terrace etc. The datasets arranged in 10 folders with name of the asana, the no. videos in folders are between 24 to 27 and total of all is 261 videos. This is good dataset for yoga asana as a action recognition and it is publicly available at https://figshare.com/articles/dataset/Yoga_Pose_Dataset/15112320. This dataset have only 10 yoga poses only with small no. of videos and recorded only front view.

Table.3 Access links of yoga pose image and video dataset

Sr. No	Dataset(Ima ge and Video)	Acces Links
1	Yoga-82[7]	https://forms.gle/tzVHwzbzCEYzZd9W8
2	Yoga Pose Dataset[8]	https://www.kaggle.com/niharika41298/yoga-poses-datase
3	Yoga Pose Image classification dataset[11]	https://www.kaggle.com/datasets/hrutisaxena/yoga-pose-image-classification-dataset
4	New Dataset for Yoga Pose Classification[12]	https://laurencemoroney.com/2021/08/23/yogapose-dataset.html#google_vignette
5	Yoga Posture Dataset[13]	https://www.kaggle.com/datasets/tr1gg3rtrash/yoga-posture-dataset
6	SK Yadav [14]	https://archive.org/details/YogaVidCollected
7	In-house dataset[15]	https://figshare.com/articles/dataset/Yoga_Pose_Dataset/15112320

Above two yoga pose video datasets available publicly as per our best review. The summarized comparison between these datasets is given in Table 2 and same can be represented graphically in figure 3.

IV.CONCLUSION

In this paper we have covered only those Yoga video datasets available publicly, during literature review we find that many author prepared their dataset but not provide publicly. This paper discovered the some more datasets that were not used by the researcher but available publicly. Most of the research in yoga pose classification used image dataset [3,5,7,8,9] but yoga asana is an activity so yoga video dataset [10,11] is the appropriate option. Image datasets [3,5,7,8,9] was prepared with the help of internet images, so many pictures are having text and watermarks and some of them are drawing only. As these datasets are not prepared under the supervision of yoga expert so few of yoga pose images are not up to the marks as per the standard pose. There is no dataset was found publicly created by clicked images. As the less work on yoga pose as activity recognition so only two yoga pose video dataset[9] are available and these are with less no. of asanas and no. of videos are not much. A large scale video dataset is required with a large no. of asanas and the videos should be recorded from more view ,existing videos are recorded from front view only. The large dataset is enhance the training of a model so it is still awaited.

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