

# Pose Tutor: An Explainable System for Pose Correction in the Wild

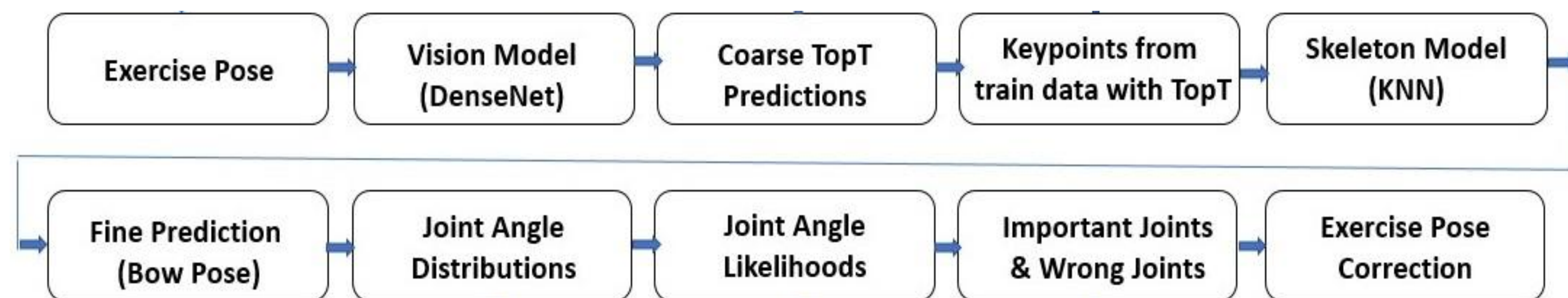
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## Introduction

We develop Pose Tutor, an AI based explainable pose recognition and correction system for human poses. Pose Tutor combines vision and pose skeleton models in a novel coarse-to-fine framework to obtain pose class predictions. An angle-likelihood mechanism is used to explain which human joints maximally caused the pose class predictions and also correct any wrongly formed joints. Our method is validated by experiments and multiple user studies.



## Pose Tutor

- **Vision Models:** 1) Pose Classification Network M\_C (DenseNet) and 2) Off-the-shelf Pose Estimation Network M\_P (TransPose)
- **Pose Skeleton Model:** We obtain pose keypoints for each training image using M\_P and use the keypoints to generate a pose vector of 10 pose angles per pose. These angle vectors are used to train a KNN based pose classifier.
- **Coarse-to-Fine Framework:** To classify an image, we first pass it through M\_C (coarse network) to obtain top T predictions for that image. Then we obtain the pose keypoints using M\_P to generate the pose vector which is classified into one of the T classes by KNN (fine network).

## Explaining the Pose Class Predictions

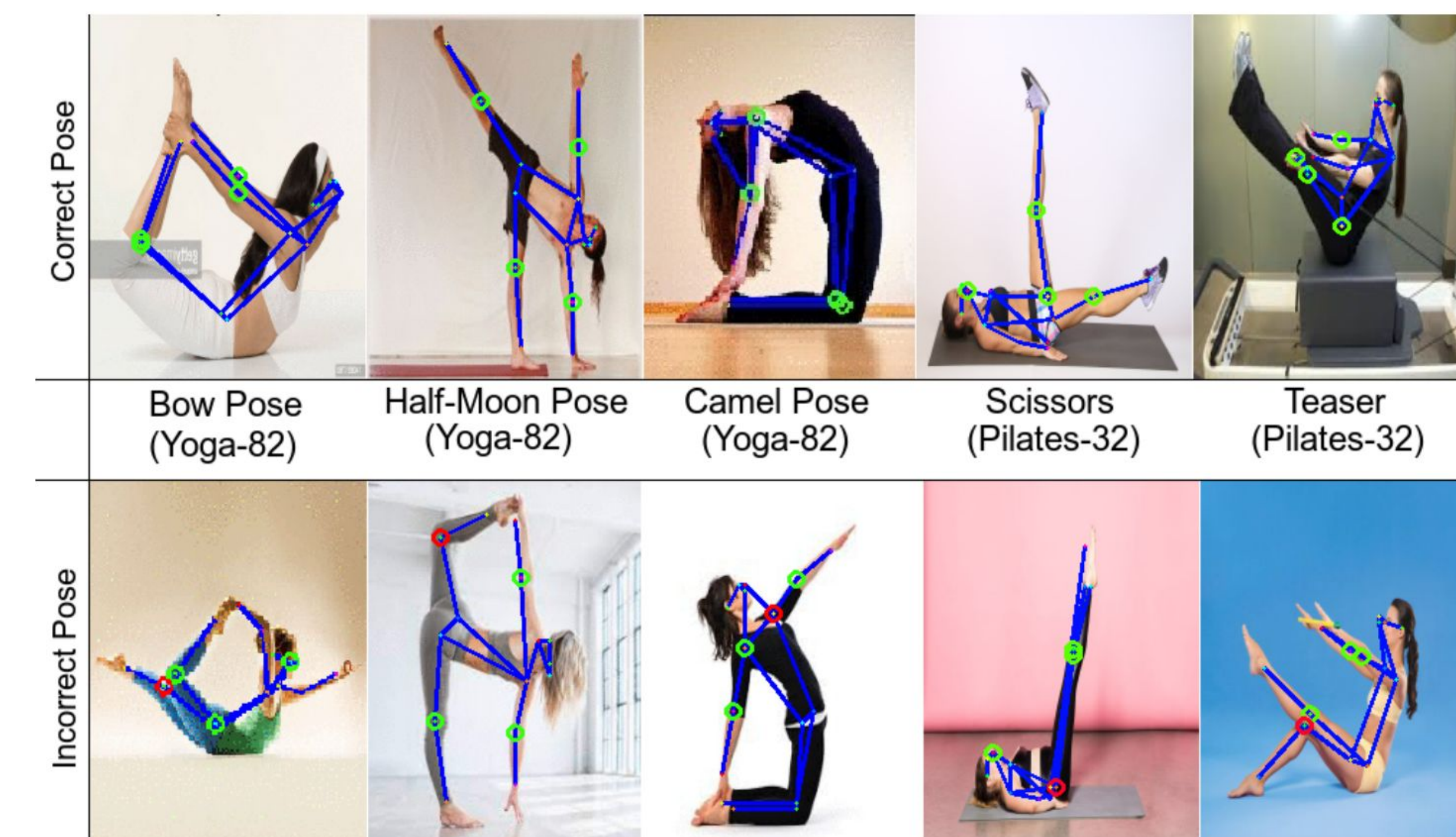
If Pose Tutor predicts a pose class C for an image I, we obtain the pose vector and identify which of the 10 angles in the pose vector have the most and least likelihood in their respective angle distributions.

Most Likelihood = Highly affecting the pose class prediction

Least Likelihood = Likely an anomaly which needs to be corrected.

## Experimental Details

- ❖ We perform experiments on 3 datasets.
  - Yoga-82
  - Pilates-32
  - Kungfu-7
- ❖ Our experiments show that out of various classifiers, DenseNet+KNN achieves the best pose classification accuracy on 2 out of 3 datasets.



- ❖ In a user study conducted with Yoga instructors, 80% of the pose explanations on Yoga-82 have been confirmed to be accurate.