



Yoga Pose Detection Using CNN

The Importance of Yoga



Health Benefits

Boosts flexibility, strength, and balance



Stress & Pain Reduction

Reduces anxiety and chronic pain (Harvard study)



Cardiovascular Health

Improves heart health (American Heart Association)



Respiration

Improves our Respiratory System



Technologies Used



Python 3.9

Versatile programming language



Keras

Easy neural network building



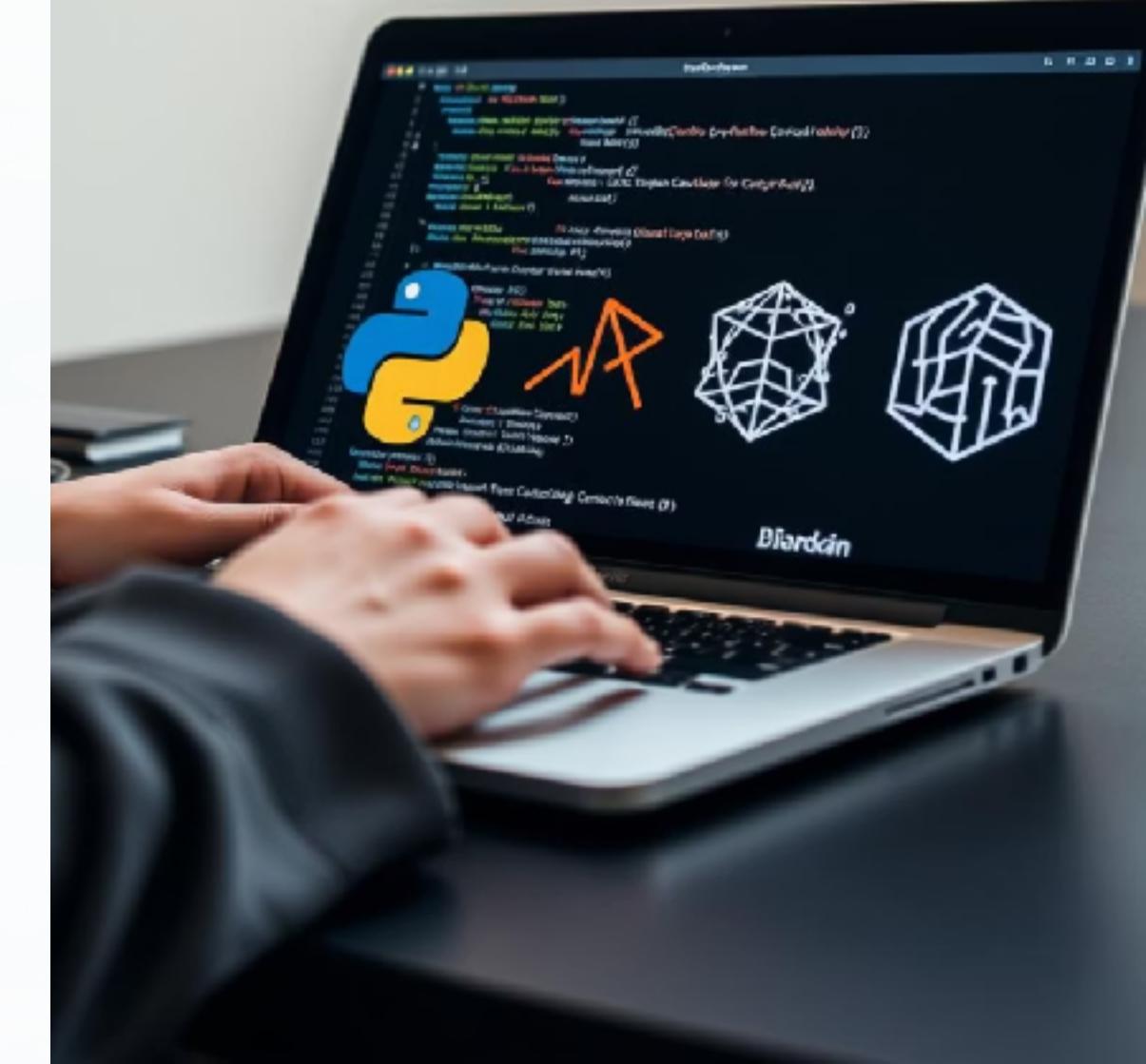
TensorFlow 2.x

Open-source ML



Streamlit

Interactive web app framework



Project Objectives

1 Model Development

Classify 25 distinct yoga poses accurately

2 Maintained Accuracy

Achieved 90% test accuracy

3 User Interface

Create intuitive app with Streamlit

4 Real-Time Detection

Provide instant feedback on poses

CNNs for Pose Detection

Feature Learning

CNNs automatically extract important image features

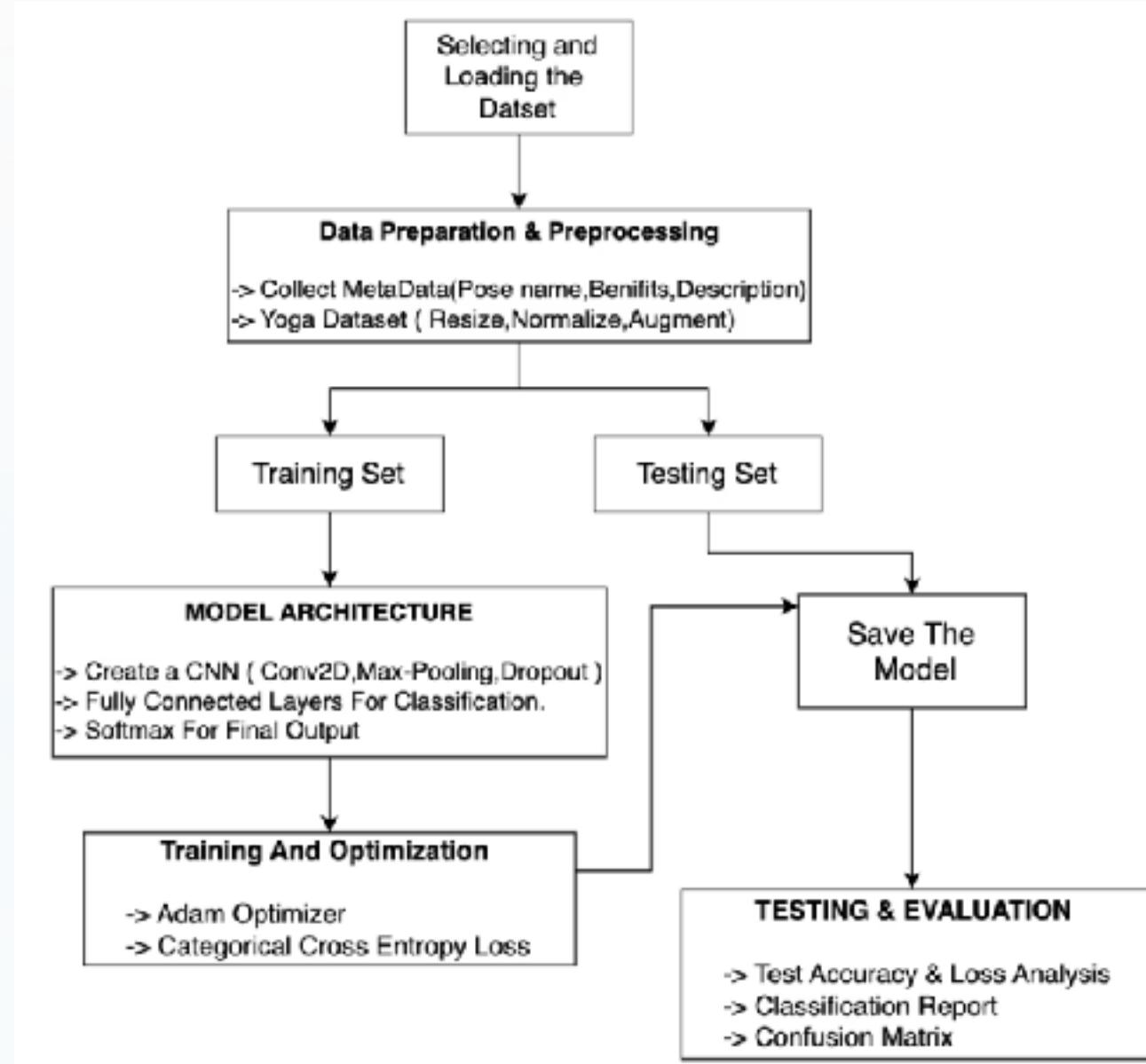
High Accuracy

Excels at image classification tasks

Real-Time Feedback

Instant pose correctness assessment to guide users

Model Design



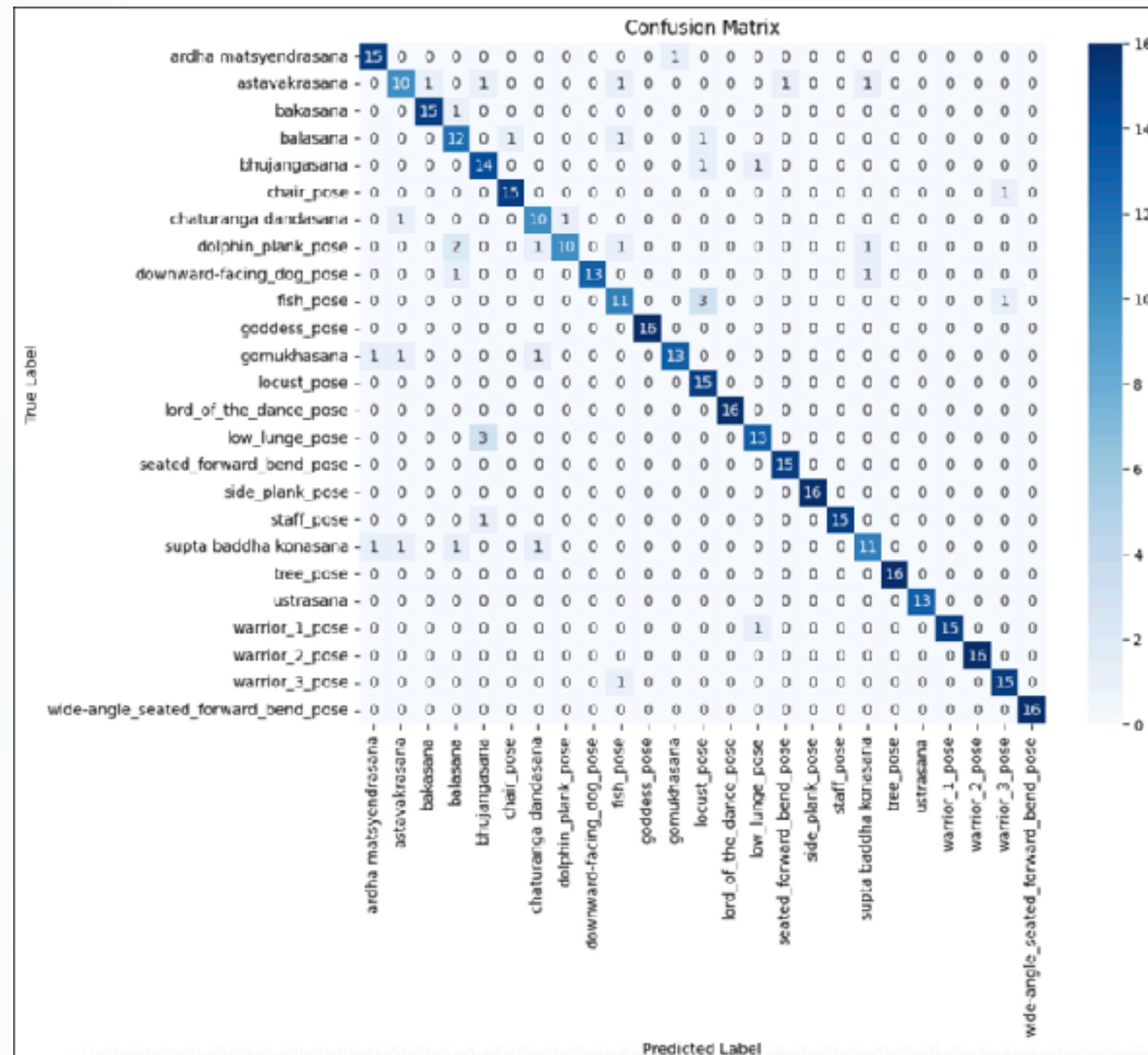
Hyper-parameters

Function	Values
Epoch	200
Batch size	32
Filter/Kernal size for convolution layer	(3, 3)
Activation function	ReLU
Loss function	categorical_crossentropy
Optimizer	adam
Regularizer	L2
Early stopping	patience=20
Reduce Learning Rate	ReduceLROnPlateau
Checkpoints	Saves best model

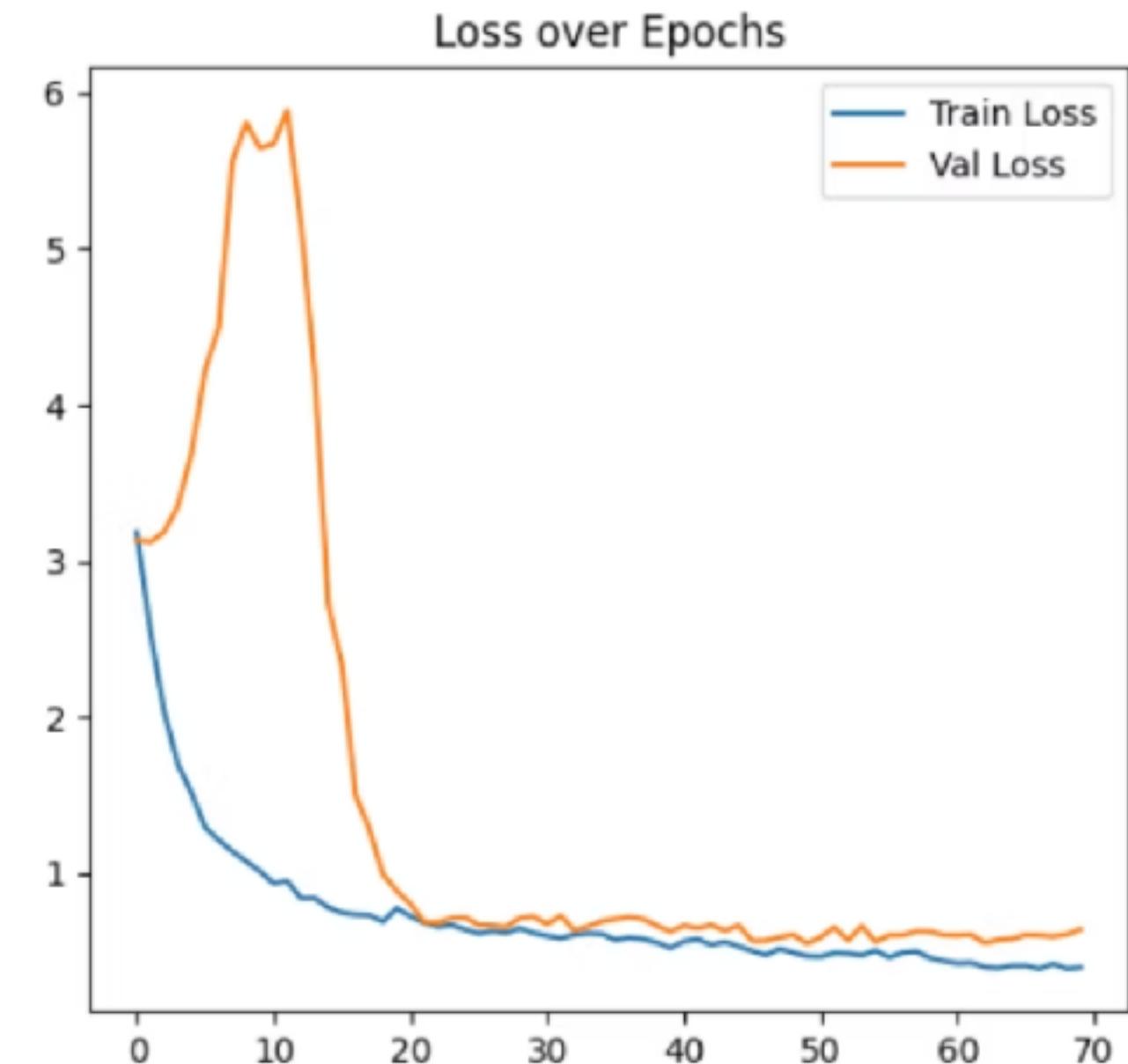
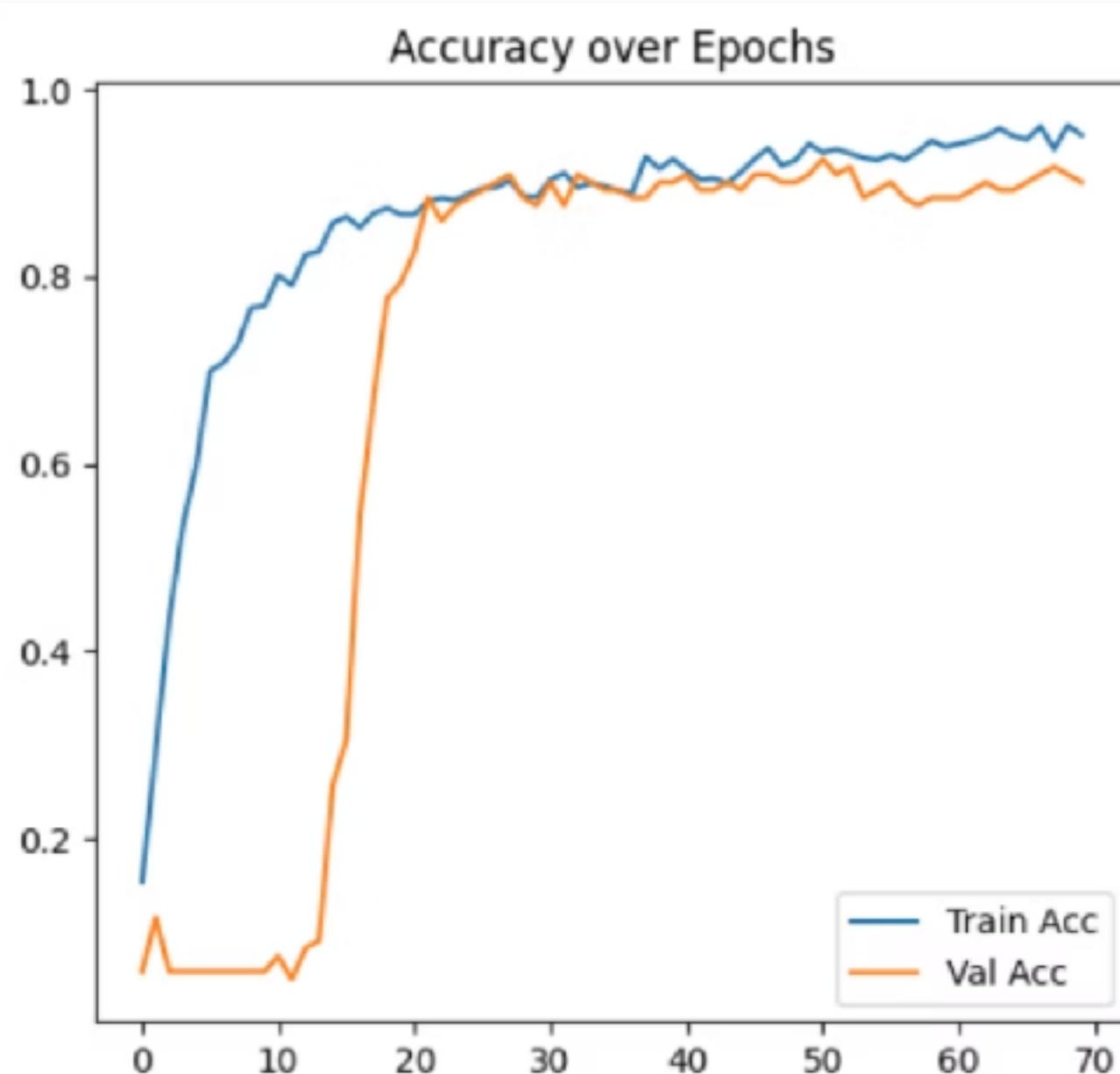
Classification Report

		precision	recall	f1-score	support
ardha matsyendrasana		0.88	0.94	0.91	16
astavakrasana		0.77	0.67	0.71	15
bakasana		0.94	0.94	0.94	16
balasana		0.71	0.80	0.75	15
bhujangasana		0.74	0.88	0.80	16
chair_pose		0.94	0.94	0.94	16
chaturanga dandasana		0.77	0.83	0.80	12
dolphin_plank_pose		0.91	0.67	0.77	15
downward-facing_dog_pose		1.00	0.87	0.93	15
fish_pose		0.73	0.73	0.73	15
goddess_pose		1.00	1.00	1.00	16
gomukhasana		0.93	0.81	0.87	16
locust_pose		0.75	1.00	0.86	15
lord_of_the_dance_pose		1.00	1.00	1.00	16
low_lunge_pose		0.87	0.81	0.84	16
seated_forward_bend_pose		0.94	1.00	0.97	15
side_plank_pose		1.00	1.00	1.00	16
staff_pose		1.00	0.94	0.97	16
supta baddha konasana		0.79	0.73	0.76	15
tree_pose		1.00	1.00	1.00	16
ustrasana		1.00	1.00	1.00	13
warrior_1_pose		1.00	0.94	0.97	16
warrior_2_pose		1.00	1.00	1.00	16
warrior_3_pose		0.88	0.94	0.91	16
wide-angle_seated_forward_bend_pose		1.00	1.00	1.00	16
accuracy			0.90	0.90	385
macro avg		0.90	0.90	0.90	385
weighted avg		0.90	0.90	0.90	385

Confusion Matrix

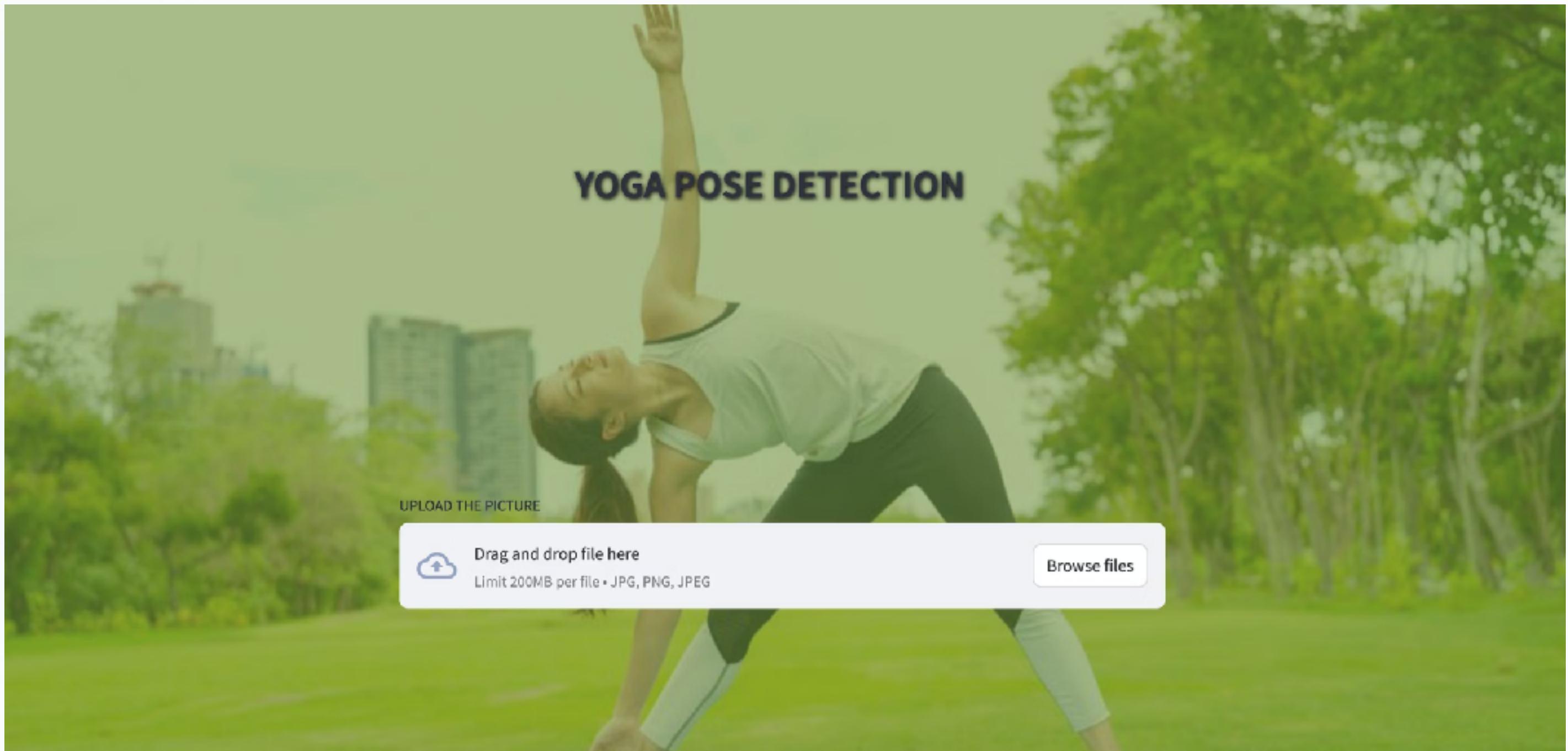


Accuracy and Loss with respect to Epochs



User Interface

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Prediction of Model

Uploaded Image Actual Pose



Chair Pose

Predicted Pose: Chair Pose

Description

Stand with feet together, bend your knees as if sitting in a chair, and extend your arms overhead.

Benefits

It strengthens the thighs, calves, and spine while stimulating the heart and abdominal organs.

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Uploaded Image Actual Pose



Downward Facing Dog Pose

Predicted Pose: Downward-Facing Dog Pose

Description

From all fours, lift your hips towards the ceiling, straighten your arms and legs, and form an inverted Vshape.

Benefits

It stretches the hamstrings, calves, and spine while strengthening the arms and improving blood circulation.

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Results and Future Work

Achievements

- 90% accuracy on test set
- Live demo using Streamlit

Next Steps

- Expand dataset to 32 yoga poses
- Integrate wearable sensors
- Develop haptic feedback corrections

THANK YOU