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Advancements in Yoga Pose Recognition and Correction: A Comprehensive Literature Review

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Abstract: ***The growing popularity of yoga, especially in post-pandemic wellness trends, has led to an increasing demand for automated systems capable of real-time pose detection, classification, and correction. This literature review surveys and compares recent advancements in yoga pose recognition and correction technologies, with an emphasis on the integration of deep learning, computer vision, and optimisation techniques. The reviewed works employ a variety of methods, ranging from CNNs, GRUs, and Vision Transformers to heuristic-based models and hybrid architectures, for both static and dynamic pose estimation. Systems leveraging lightweight models, such as MoveNet, as well as multimodal approaches combining AR, personalised recommendations, and real-time corrective feedback, demonstrate significant potential for mobile, web-based, and wearable deployments. This review synthesizes insights on model performance, technological innovations, and future opportunities, providing a foundation for researchers and developers aiming to build intelligent, user-centric yoga tutor applications.***

Keywords: ***Real-Time Pose Detection, Deep Learning, Computer Vision, Heuristic-Based Models, CNNs, GRUs, Vision Transformers, Real-Time Corrective Feedback.***

Abbreviations:
SVD: Singular Value Decomposition
CNN: Convolutional Neural Network
SA-GRU: self-attention-based GRU
ECSO: Enhanced Chicken Swarm Optimisation
GRU: Gated Recurrent Units
ViT: Vision Transformer
KNN: K-Nearest Neighbours
MLP: Multilayer Perceptron
DTW: Dynamic Time Warping

I. INTRODUCTION

Yoga, as an ancient practice promoting physical and mental wellness, has seen a dramatic resurgence in recent years, particularly with the rise of remote fitness solutions during the COVID-19 pandemic [1], [10]. Simultaneously, rapid advancements in deep learning and computer vision have enabled the development of intelligent systems capable of automated human pose estimation and activity recognition [2], [14]. These innovations are now being applied to yoga pose detection and correction, where a traditional instructor-led practices are increasingly being augmented or replaced by AI-powered tools that deliver real-time feedback [3], enhancing not only accuracy and accessibility but also user engagement [13], [22].

A broad spectrum of approaches has emerged to address this challenge, from popular pose estimation frameworks like OpenPose [12], MediaPipe [14], and MoveNet [22], to deep learning architectures such as Convolutional Neural Networks (CNNs) [9], Gated Recurrent Units (GRUs) [6], Vision Transformers (ViTs) [20], and hybrid optimization models like AYPR-ECSODL [5]. These systems aim to accurately classify yoga postures, evaluate deviations from ideal form, and provide corrective guidance through visual cues, audio prompts [16], or even augmented reality (AR) overlays [33].

Innovations such as Multiview pose correction [1], step-by-step flow tracking [34], mood-based asana recommendation systems [2], and real-time personalized feedback [25] are further advancing the capabilities of AI-based yoga tutors. These systems are also increasingly lightweight and mobile-optimized, supporting real-time applications across smartphones, web browsers [3], and edge devices [30].

This literature review presents a detailed comparative analysis of 34 recent works on yoga pose recognition and correction. It examines key methodologies, datasets, model performance metrics, and user-centric features. The study aims to highlight technological diversity, identify best practices, and suggest future research directions for building robust, scalable, and intelligent yoga monitoring systems.

II. LITERATURE SURVEY

Proposes a real-time yoga pose detection and correction system that supports both front and side views. It uses Google's fast and accurate MoveNet model for key point detection and a custom CNN for classifying pose correctness. The system is trained on a dataset of three yoga poses (Tree, Chair, and Cobra), and provides immediate text and audio feedback if a pose is incorrect. A timer tracks how long a user holds a correct pose. The system achieves about 83% accuracy, is lightweight for both mobile and desktop use, and received positive feedback in user studies. Future work includes adding more poses, supporting multiple cameras, and accommodating different body types [1].

Presents a personalised yoga system that combines deep learning and computer vision to recommend [2], detect, and correct yoga poses based on a user's mood. It integrates techniques such as Singular Value Decomposition (SVD) for mood-based pose recommendations, YOLOv3 for detecting yoga poses, PoseNet and ORB for keypoint extraction, and an angle heuristic algorithm for real-time pose correction. Yoga pose classification achieved its best performance using the EfficientNet-B0 architecture, reaching an accuracy of

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approximately 78%. The system aims to enhance stress relief, emotional balance, and physical wellness by providing mood-driven yoga recommendations and real-time feedback, promoting a more holistic and personalized yoga experience.

Presents a real-time yoga pose recognition and correction system using a Convolutional Neural Network (CNN) and Mediapipe for pose estimation. It classifies five yoga poses — Downward Dog, Goddess, Plank, Tree, and Warrior II — using a Kaggle dataset enhanced by data augmentation techniques. The model achieves 87% validation accuracy and offers instant corrective feedback via a webcam-based system. Real-time feedback is delivered when posture deviations are detected, helping users safely improve their practice. Future work includes expanding the dataset to cover more poses, developing a mobile-friendly version, and enhancing accessibility and privacy protections [3].

Proposes a novel method for early recognition of human actions in 3D space by decomposing actions into Subactions and training deep learning models to recognize them separately. The system leverages the idea that recognising smaller components of a complex action can lead to faster and more accurate prediction of subsequent actions. Deep networks are trained on Subactions using features extracted from 3D skeletal data, leading to earlier and more reliable recognition compared to recognizing the full action at once. The method is designed to enhance performance for real-time applications, such as surveillance, human-robot interaction, and healthcare monitoring [4].

Proposes an AI-based system (AYPR-ECSODL) to recognize and classify yoga poses from images. The system utilises Wiener filtering and Dynamic Histogram Equalisation for image pre-processing, YOLOv8 for pose segmentation, and OpenPose for extracting body keypoints. A self-attention-based GRU (SA-GRU) model classifies poses, while Enhanced Chicken Swarm Optimisation (ECSO) fine-tunes the parameters for improved accuracy. Tested on a Kaggle yoga pose dataset (15 poses), the system achieved very high precision (~99.6%) and outperformed other deep learning models. The method enhances pose recognition quality, injury prevention, and practice monitoring, but acknowledges challenges such as computational complexity and potential overfitting on small datasets [5].

Proposes a system that recognises yoga poses from videos using a hybrid deep learning model that combines Mediapipe, Convolutional Neural Networks (CNN), and Gated Recurrent Units (GRU). Mediapipe extracts 33 body keypoints, CNN captures spatial features, and GRU models temporal patterns across video frames. The model was trained on a dataset of six yoga poses (e.g., Bhujangasana, Tadasana, Vrikshasana) and achieved 99.95% test accuracy and 99.27% real-time accuracy at a fast-processing speed of ~38 frames per second (fps), outperforming earlier methods. It demonstrates strong potential for real-time yoga pose recognition and lays the groundwork for future expansion to more complex asanas and real-time feedback systems [6].

Presents a CNN-based system that provides real-time feedback for yoga pose correction using regular RGB cameras. It addresses issues such as limited pose datasets, similar-looking poses, and dynamic changes that occur during yoga practice. The system extracts keypoints using OpenCV, calculates joint angles, and identifies correct or incorrect posture segments by marking them with green (good) or red (bad) lines. It achieved a training accuracy of 98.58% and validation accuracy of 94.21%, along with substantial precision (92.8%) and recall (90.9%). The model also exhibits stable performance with learning rates ranging from 0.001 to 0.005. Compared to earlier techniques like OpenCV, PoseNet, and MediaPipe, the proposed approach offers better accuracy while remaining lightweight enough for daily use [7].

Presents three methods for detecting and counting push-ups in real time without requiring GPUs or IoT sensors: push-up pose classification, angle-heuristic estimation, and optical flow detection. The models use MoveNet for human pose estimation and are trained on over 2000 images with data augmentation to simulate real-world conditions. Among the methods, angle-heuristic estimation offered the best balance of speed and accuracy for mobile deployment, while pose classification was the most accurate but slowest, and optical flow was the least accurate. The study highlights that the proposed lightweight detectors are suitable for mobile fitness applications and suggests future work, including mobile deployment (TFLite conversion) and integrating RGB-depth cameras for enhanced 3D pose estimation [8].

Presents an advanced system for real-time yoga pose classification by integrating Convolutional Neural Networks (CNNs) with Google's MediaPipe framework. Traditional methods for yoga pose classification were either manual or used basic machine learning, lacking accuracy and real-time capability [9].

The proposed method uses MediaPipe to capture human body keypoints (skeletons) from live video, and then processes these keypoints through a deep CNN for accurate classification of yoga poses. The model successfully achieves a validation accuracy of 99.62%, demonstrating its effectiveness. The system not only identifies correct poses but also detects incorrect postures, providing real-time feedback and alerts to users.

Proposes a real-time yoga pose analysis and correction system using computer vision, machine learning, and deep learning techniques. It utilises PoseNet, MediaPipe, and OpenCV to estimate keypoints from body images and provides personalised feedback to correct postures, eliminating the need for a human instructor. The model, trained on a Kaggle yoga pose dataset, classifies five yoga poses with an accuracy of approximately 80%. Additional features, including a recommendation system, Gym AI trainer, and chatbot, are integrated to enhance user engagement. Future work aims to expand pose categories, improve accuracy, and integrate VR and health monitoring [10].

Proposes an interactive toy designed to help autistic children learn yoga and improve their social adaptability. The toy integrates IoT technologies and a deep learning framework called HARNet. HARNet combines ResNet50 (a deep learning model) with an accelerated genetic algorithm to detect and correct yoga postures performed by the child, based on the Yoga-82 dataset. The toy utilises touch sensors, vision cameras, and speech and visual feedback to engage children. The framework achieves 98.52% accuracy in recognizing yoga poses. The system significantly reduces computational complexity by detecting variations between video frames before running posture recognition. The prototype toy is cost-effective compared to existing humanoid toys, and the authors discuss future work aimed at enhancing its IoT edge computing capabilities and hardware robustness [11].

Proposes a method for Human Activity Recognition (HAR) from still images by extracting human pose keypoints using the OpenPose framework. OpenPose detects 18 body keypoints from images. These key points are then fed into supervised machine learning algorithms (such as Logistic Regression, SVM, KNN, Decision Tree, and Random Forest) to classify human activities into five categories: sitting, standing, running, dancing, and lying. A custom dataset comprising approximately 1,000 images was created for this purpose. Among the models tested, Logistic Regression, SVM, and Random Forest achieved the best performance (~80% accuracy). The study highlights challenges such as pose variations and dataset limitations, and suggests future improvements, including expanding activity types and handling missing keypoints [12].

Presents the Infinity Yoga Tutor, a mobile-based system designed to detect and correct yoga postures in real-time. Using a smartphone camera, the app streams live video to a backend system where OpenPose or Mask R-CNN detects body keypoints. These key points are analysed using a deep learning model that combines Time-Distributed CNNs, LSTM networks, and Softmax regression to classify six common yoga poses. OpenPose-based models ultimately performed better in real-time applications, achieving a test accuracy of 99.91%. The app provides instant feedback, allows users to select from three difficulty levels (beginner, intermediate, and expert), and visually guides them with videos and skeletal overlays to help them perform yoga poses correctly without expert supervision [13].

Proposes iSmartYog, a deep learning-based system for real-time recognition and correction of yoga poses. It utilises MediaPipe to extract 33 body keypoints from videos and applies a hybrid CNN-GRU model to recognise 24 yoga asanas from a newly created SmartYog dataset (2,700 videos, 31 participants). CNN extracts spatial features, and GRU captures temporal motion. The model achieves ~93.8% accuracy on complex and diverse test data, and can operate efficiently on low-cost hardware, making it ideal for innovative healthcare applications. Additionally, the system generates personalized correction feedback using angles, distances, and body part positions to help users improve their poses in real-time [14].

Proposes LGDeep, a new ensemble deep learning model for yoga pose classification, combining Xception, VGGNet, and SqueezeNet architectures enhanced with LDA (Linear Discriminant Analysis) and GDA (Generalized Discriminant Analysis) features. Four ensemble models — Deep, LDeep, GDeep, and LGDeep — are introduced and evaluated on a Kaggle yoga dataset comprising five poses (Down Dog, Goddess, Plank, Tree, Warrior 2). The LGDeep model achieves 100% classification accuracy, outperforming previous methods. This system not only recognises yoga poses but also offers significant potential for broader applications in fitness, healthcare, and sports analysis [15].

Proposes PosePerfect, a system that combines HRNet (for high-precision keypoint detection) and Gemini Vision Pro (for intelligent posture correction) to enhance yoga pose classification and real-time feedback. Trained on the YOGA2022 dataset, the system achieves a classification accuracy of 95.23%. HRNet preserves high-resolution features during pose estimation, while Gemini Vision Pro provides personalised, real-time feedback to correct yoga postures through a web application. The study demonstrates that this integration significantly enhances user experience and yoga learning, with plans to deploy the system on mobile platforms and further optimise real-time processing in the future [16].

Presents a real-time system for detecting and correcting the 12 postures of Surya Namaskara (Sun Salutation) using MediaPipe. The system identifies body landmarks, computes joint angles, and provides corrective feedback to ensure accurate pose alignment. It achieves 94.2% accuracy with MediaPipe, outperforming PoseNet (88.5% accuracy). MediaPipe also offers lower latency (25 ms vs. 40 ms) and detects more joints (33 vs. 17), making it superior for real-time yoga posture correction. Future work suggests adding voice feedback and broader pose libraries to enhance usability [17].

Proposes a real-time yoga pose recognition and correction system combining deep learning and computer vision techniques. It extracts human body landmarks and analyses them to recognise yoga poses and provide accurate corrective feedback. The system emphasizes accuracy, precision, recall, and F1-score to evaluate performance. It also discusses potential future enhancements, such as AR/VR integration, to create a more immersive experience. The goal is to make yoga practice safer and more effective by ensuring users maintain correct posture through automated feedback [18].

Proposes YogaConvo2d, a lightweight CNN model for yoga pose classification, utilising skeletonised images extracted via MediaPipe to enhance model accuracy and speed. The system classifies five yoga poses (Down-dog, Goddess, Plank, Tree, Warrior) with very low latency. Skeletonisation helps eliminate background noise, thereby enhancing the model's performance. YogaConvo2d achieves 99.62% validation accuracy on skeletonised data, outperforming other models, including VGG16, InceptionV3, NASNetMobile, and InceptionResNetV2. The study confirms that MediaPipe preprocessing significantly enhances the accuracy of deep learning models for real-world yoga applications [19].

Applies Vision Transformer (ViT) for yoga pose classification, using a dataset created by combining two existing yoga pose datasets. Due to the small dataset size, transfer learning is employed. ViT is fine-tuned and achieves 92.61% accuracy and 92.62% F1-score, outperforming various CNN-based models like ResNet, MobileNet, DenseNet, and EfficientNet. Although ViT offers superior accuracy, it has a large number of parameters, which makes it slower. Future work suggests optimising ViT to reduce its size and accelerate inference for real-world yoga pose classification applications [20].

Presents a real-time yoga pose correction system using MediaPipe and OpenCV. The system detects body joints, calculates the angles between them, and compares these angles to the threshold angles stored in a database. Users receive real-time feedback on incorrect posture, accompanied by an accuracy bar for each body part. The model uses a web-based app where users select ailments and associated yoga asanas, then receive instant corrective prompts. Plans include expanding to mobile platforms, supporting users with disabilities, and integrating additional fitness and wellness features, such as calorie tracking and meditation guidance [21].

Presents YogaMentor, a React-based web application that uses TensorFlow and MoveNet for real-time yoga pose recognition and correction. It focuses on helping users maintain correct poses by detecting 17 body keypoints, tracking pose duration, and providing immediate feedback with a green skeleton for proper alignment. The app includes seven yoga poses (Tree, Chair, Cobra, Warrior, Dog, Shoulder Stand, Triangle), offers pose streak tracking, and stores user progress in Firebase. Future improvements include adding targeted pose training and background music to enhance the immersive user experience [22].

Introduces a PoseNet-based real-time yoga pose classification and correction system designed to help users self-correct during practice. It utilises PoseNet to detect 17 body keypoints and a K-Nearest Neighbours (KNN) classifier to recognise four yoga poses (Mountain, Goddess, Plank, Garland) with 99.6% classification accuracy. The system calculates joint angles and compares them to ideal ranges, providing audio and visual feedback to guide corrections. It works across various lighting conditions and distances, enhancing accessibility and effectiveness. Future improvements include expanding the dataset, supporting vernacular languages, developing a mobile app, and implementing multi-user support [23].

Proposes a real-time yoga pose detection and correction system using MediaPipe for 3D pose estimation and a Multilayer Perceptron (MLP) for pose classification. Five yoga poses (Tadasana, Goddess, Warrior II, Vrikshasana, and Bhujangasana) were classified with 99% accuracy. Keypoints extracted by MediaPipe are compared against standard angles to detect pose errors, and real-time visual (red/green indicators) and textual feedback are provided to guide corrections. The system significantly enhances yoga learning and aims for future improvements, such as reducing inference time, supporting multiple users, and incorporating more complex asanas [24].

Proposes a web-based real-time yoga pose detection and correction system using MediaPipe for pose estimation and OpenCV for video processing. The system recognises nine yoga poses (e.g., Tree Pose, T-Pose, Warrior II) by tracking 33 body keypoints and calculating the corresponding joint angles. Users can choose between a demo mode (video tutorials) and a practice mode (live feedback). If the user's posture aligns with standard angles, green markers and correct pose names are displayed; otherwise, red markers indicate misalignment. The system avoids deep learning models, making it lightweight and faster, ideal for real-time, home-based yoga learning. Future enhancements include mobile app development, real-time verbal feedback, and elderly monitoring features [25].

Presents a computer vision-based system for real-time yoga pose detection and correction using MediaPipe and the Cue Method. The system extracts 33 body keypoints, calculates joint angles, and compares them to ideal poses to detect errors. OpenCV is used for video processing, while NumPy helps in angle calculations. The system provides real-time visual feedback to guide users in correcting their poses, aiming to make yoga safer and more accessible, particularly for those practising without in-person instructors. The study concludes that combining Mediapipe and OpenCV provides a lightweight, efficient, and scalable solution for yoga pose correction, with potential for future integration into apps, wearables, and broader fitness applications [26].

Proposes a PoseNet-based real-time yoga pose detection and correction system to improve the safety and effectiveness of yoga practice. The system captures live video streams, extracts keypoints using PoseNet (a CNN-based model), classifies six yoga poses (Mountain, Tree, Downward Dog, Warrior I, Warrior II, and Chair), and provides real-time feedback. If a pose is incorrect, the system pauses the session timer until the user corrects the posture, ensuring proper form before moving forward. The model achieved 95% validation accuracy and maintained high performance even in complex environments. The platform features learning, practice, and informational modules to enhance user engagement [27].

Proposes a deep learning-based system for recognising and correcting beginner-level yoga poses, utilising MediaPipe for pose estimation and several neural network models, including CNN, CNN-LSTM, VGG16, and ResNet50. A carefully curated and augmented dataset (with GANs) of 5,134 images categorized into beginner, intermediate, and advanced levels was used for training. Among the models, ResNet50 achieved the highest post-augmentation accuracy (96.08%), followed by CNN (99%), CNN-LSTM (98.32%), and VGG16 (95.26%). The system provides real-time feedback to help users refine their poses, aiming to democratise yoga training and enhance both safety and effectiveness [28].

Evaluates the use of pre-trained CNN models — VGG-16, AlexNet, and GoogleNet — via transfer learning to classify 82 yoga poses from the Yoga-82 dataset. The study shows that GoogleNet achieved the best performance, with 87.89%

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Top-1 accuracy and 97.08% Top-5 accuracy, outperforming earlier benchmarks (like DenseNet-201). GoogleNet also had the smallest model size (27 MB) and the best trade-off between training time and accuracy. The system aims to support automated virtual yoga training platforms, making it easier for users to practice correct poses without the need for an instructor [29].

Presents a real-time web-based system for yoga pose recognition and correction using TensorFlow Lite and the MoveNet model. The system detects 17 key body points, calculates their distances to identify poses, and gives feedback via a JavaScript-based frontend. Seven poses (e.g., Tree, Dog, Warrior) are supported, and the model achieves ~98% training accuracy and ~90% real-world accuracy during tests with five practitioners. The approach emphasizes real-time correction, lightweight processing, and an intuitive user interface. Plans include adding voice feedback and expanding pose libraries for broader yoga support [30].

Proposes Yoga Vision, a real-time yoga pose detection and correction system combining Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) models. Using MediaPipe to extract 33 body keypoints, the system classifies six yoga poses (Bhujangasana, Padmasana, Shavasana, Tadasana, Trikonasana, and Vrikshasana) and provides instant feedback if the posture is incorrect. Data augmentation techniques enhanced the model's robustness. The model achieved 99.53% test accuracy and precision/recall around 98.7%, outperforming many previous methods. Future work includes expanding to more poses, improving multi-person pose estimation, and developing portable self-learning and forecasting tools [31].

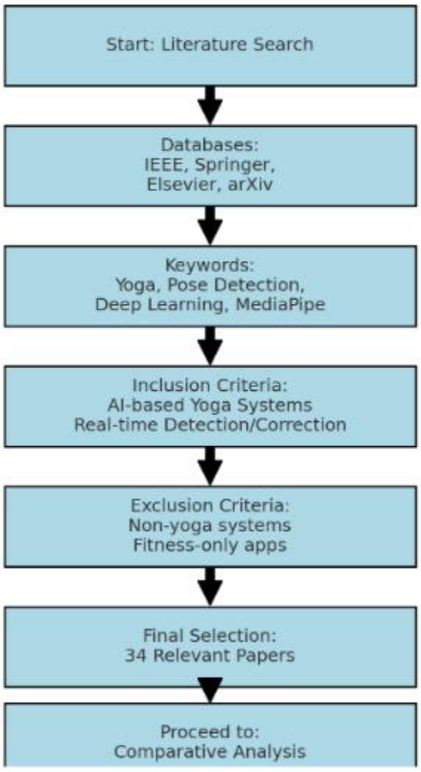
Introduces Yog-Guru, a real-time yoga poses recognition and correction system using Convolutional Neural Networks (CNNs) and keypoint extraction. The system detects 15 body keypoints, classifies six yoga poses (e.g., Natarajasana, Trikonasana, Vrikshasana) based on a CNN model trained with Yoga-82 dataset images, and calculates joint angles to identify posture errors. It provides text-based corrective feedback to help users improve alignment. The system achieved an overall classification accuracy of 81%, with some poses, such as Utkatasana, reaching an F1-score of 0.85. Future improvements include adding audio feedback, expanding pose coverage, and applying the method to other fields, such as sports and dance [32].

Presents YogMaster, a web-based application that uses TensorFlow MoveNet to detect 17 body keypoints, classify yoga poses via a Keras neural network, and provide real-time corrective feedback using both visual and audio cues. The system recognizes five yoga poses (Adho Mukha Svanasana, Padmasana, Utkatasana, Utthita Trikonasana, Vrikshasana) with 99.47% accuracy. It also integrates Augmented Reality (AR) models (created in Blender) to guide users visually during practice. YogMaster aims to enable safe, instructor-free yoga practice by combining pose detection, correction, and immersive AR-based learning [33].

Presents Zen Mentor, a mobile application that uses MediaPipe BlazePose to extract body keypoints and Dynamic Time Warping (DTW) to compare a user's movement sequence with a mentor's ideal pose sequence. Unlike systems that only classify poses as right or wrong, Zen Mentor tracks and corrects each step within an asana, offering real-time feedback if the user's angles deviate beyond a ±30° threshold. The app uses Flutter for cross-platform development and Django for the backend. It provides a step-by-step correction flow, ensuring users maintain proper posture throughout the yoga practice [34].

III. REVIEW CRITERIA

To ensure a comprehensive and systematic evaluation of yoga pose recognition and correction systems, this literature review was conducted following a structured methodology. A total of 34 peer-reviewed papers published between 2020 and 2024 were selected from reputable databases, including IEEE Xplore, Springer, Elsevier, ScienceDirect, and arXiv. Keywords used for the search included "yoga pose recognition," "pose correction," "MediaPipe," "MoveNet," "deep learning yoga," and "real-time posture detection." Only studies focusing on automated or AI-based systems that offered pose classification and/or correction features were included. Papers limited to traditional fitness tracking or non-yoga activities were excluded. Each selected work was analysed based on consistent parameters, including the dataset used, pose estimation technique, machine learning model architecture, type of correction feedback, accuracy, and unique contributions or innovations. This standardised approach enabled a transparent and objective comparative analysis, highlighting trends, strengths, and limitations across different methodologies. The resulting synthesis provides valuable insight into the current state and future direction of AI-assisted yoga systems.

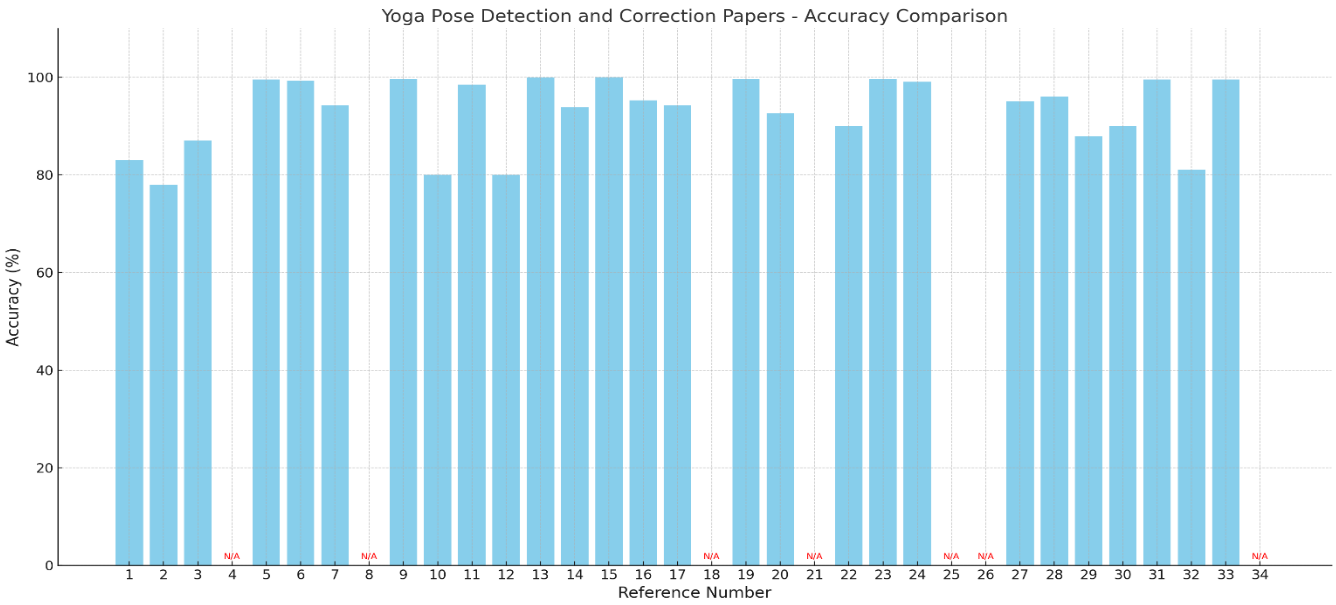


[Fig.1: Review Methodology Flow Chart]

IV. COMPARATIVE ANALYSIS

Table I: Table of Comparison of Different Survey Papers

Criteria	Dataset & Poses	Detection Method	Model Used	Correction Feedback	Accuracy	Special Features
[1]	Custom (3 poses, multiview)	MoveNet	CNN	Text and audio feedback	83%	Multiview real-time detection
[2]	Custom dataset	YOLOv3 + PoseNet + ORB	EfficientNet-B0	Angle heuristic correction	77.94%	Mood-based yoga recommendation
[3]	Custom (5 poses)	MediaPipe	CNN	Real-time visual correction	87%	Mobile-focused lightweight system
[4]	Public 3D datasets	Depth maps + 3D CNN + GRU	GRU model	Early action prediction	High	Early action detection for safety
[5]	Kaggle yoga dataset (15 poses)	YOLOv8 + OpenPose	SA-GRU with ECSO optimization	None	>99.5%	Enhanced optimization for high accuracy
[6]	Custom video dataset	MediaPipe	CNN + GRU hybrid	Real-time corrective feedback	99.27%	Real-time efficient hybrid model
[7]	Custom (dynamic poses)	OpenCV (keypoints)	CNN + Time-distributed CNN + LSTM	Colour-coded visual correction	94.21%	Dynamic pose correction system
[8]	Push-up exercise data	MoveNet	CNN + heuristic methods	Push-up counting	-	Fitness-focused mobile system
[9]	Yoga-82	MediaPipe	Advanced CNN	Real-time pose feedback	99.62%	Designed for wearables/mobile
[10]	Custom dataset	PoseNet + OpenCV	CNN	Personalized feedback (cosine similarity)	80%	AI chatbot and recommendations
[11]	Yoga-82	Video frame filtering	ResNet50 + Genetic Algorithm	Vision and speech feedback	98.52%	IoT-enabled yoga recognition system
[12]	Custom (5 activities)	OpenPose	Logistic Regression, SVM, KNN, RF	None	~80%	Simple activity classification
[13]	Yoga-82 (6 poses)	OpenPose + Mask R-CNN	CNN + LSTM	Visual skeletal overlay feedback	99.91%	Mobile app with user-level difficulty
[14]	SmartYog dataset (24 asanas)	MediaPipe	CNN + GRU	Personalized correction	~93.8%	Low-cost hardware-friendly
[15]	Kaggle yoga dataset (5 poses)	-	Ensemble (Xception + VGGNet + SqueezeNet)	None	100%	LDA and GDA enhanced features
[16]	YOGA2022 dataset	HRNet + Gemini Vision Pro	HRNet-based CNN	Real-time personalized feedback	95.23%	Web-based yoga tutor
[17]	Custom (12 poses)	MediaPipe vs PoseNet	Heuristic angle estimation	Textual correction	94.2%	Focus on Surya Namaskara
[18]	Custom dataset	MediaPipe	CNN	Visual feedback (AR/VR future)	High (not specified)	AR/VR-ready architecture
[19]	Yoga-82	MediaPipe skeleton images	Custom CNN (YogaConvo2d)	None	99.62%	Lightweight real-world CNN model
[20]	Combined datasets	-	Fine-tuned Vision Transformer (ViT)	None	92.61%	Vision Transformer application
[21]	Custom	MediaPipe + OpenCV	Heuristic on angles	Real-time visual correction	-	Web yoga correction system
[22]	Custom (7 poses)	MoveNet	TF Lite backend	Visual green skeleton feedback	~90%	Firebase-connected React app
[23]	Custom (4 poses)	PoseNet	KNN	Visual and audio correction	99.6%	Audio guidance enabled
[24]	Custom (5 poses)	MediaPipe 3D	Multilayer Perceptron (MLP)	Angle deviation alerts	99%	Real-time correction using 3D keypoints
[25]	Custom (9 poses)	MediaPipe + OpenCV	Angle-based heuristics	Visual markers (green/red)	-	Lightweight, simple web app
[26]	Custom dataset	MediaPipe	Cue-based classification	Visual feedback	-	Lightweight angle checking
[27]	Custom (6 poses)	PoseNet	CNN	Session timer with pose checking	95%	Progress tracking enabled
[28]	GAN-augmented yoga dataset	MediaPipe	CNN, CNN-LSTM, VGG16, ResNet50	Real-time corrective feedback	ResNet50: 96.08%	Dataset expanded with GAN
[29]	Yoga-82	Transfer Learning	VGG16, AlexNet, GoogleNet	None	GoogleNet: 87.89%	Top-5 accuracy 97.08%
[30]	Custom (7 poses)	MoveNet + TensorFlow Lite	CNN model	Real-time correction (JS frontend)	~90%	Lightweight web-based trainer
[31]	Custom (6 poses)	MediaPipe	CNN + LSTM	Visual real-time feedback	99.53%	Stepwise correction analysis
[32]	Yoga-82 (6 poses)	Keypoint angle checking	CNN	Text-based corrective prompts	81%	Targeted correction fields
[33]	Custom (5 poses)	MoveNet	Keras Neural Net	AR visual + audio correction	99.47%	Augmented Reality integration
[34]	Custom dataset (stepwise flow)	BlazePose + DTW	DTW sequence matching	Stepwise feedback alerts	-	Focus on step-by-step correction



[Fig.2: Accuracy Comparison Across all 34 Papers]

V. CONCLUSION

The evolution of yoga pose recognition and correction systems has been significantly accelerated by advances in deep learning, computer vision, and human pose estimation technologies. From classical CNN-based classifiers to sophisticated models like Vision Transformers, ensemble networks, and real-time pose estimators such as MoveNet and MediaPipe, a wide variety of approaches have been explored to automate and enhance the yoga practice experience.

Through the comparative analysis, it is evident that lightweight and fast systems (e.g., MoveNet-based frameworks) are highly preferred for real-time applications on mobile and web platforms, while ensemble and optimization-enhanced deep models (e.g., LGDeep, AYPR-ECSODL) deliver exceptionally high classification accuracy for static datasets. Multiview support, step-by-step correction, augmented reality integration, and personalised feedback mechanisms have emerged as key trends, focusing not only on pose recognition but also on user engagement and individualised improvement.

Despite impressive advancements, challenges such as handling occlusions, maintaining low latency across diverse devices, scaling to a broader set of yoga asanas, and providing dynamic real-time feedback remain partially addressed. Future research should explore hybrid models that combine spatial-temporal learning, multimodal feedback (visual, audio, haptic), and context-awareness (user's skill level, physical limitations) to create more adaptive and inclusive systems.

Overall, the surveyed literature suggests a promising future for AI-based yoga monitoring systems, where personalised, accessible, and accurate practice guidance can be seamlessly integrated into everyday fitness routines, thereby contributing significantly to the fields of innovative healthcare, fitness technology, and human-computer interaction.

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After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

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