IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

AgriNexus: A Full Stack Platform for Real Time Agricultural Market Rates with MLPowered Crop Advisory and Disease Detection

S. Sasirekha[1], Karanam Ajay Kamal[2], Gopalakannan N[3], Balaji K[4]
Assistant Professor (M.E.), Computer Science and Engineering[1]
Students, Computer Science and Engineering[2,3,4]
Dhanalakshmi College of Engineering, Chennai, Tamil Nadu
sasirekha.s@dce.edu.in, karanamajaykamal.cse2021@dce.edu.in
gopalakannann.cse2021@dce.edu.in, balajik.cse2021@dce.edu.in

Abstract: *AgriNexus is a comprehensive full-stack platform designed to support farmers by providing real-time agricultural market rates, machine learning–powered crop advisory, and crop disease detection. The system integrates a user-friendly frontend with a robust backend to deliver live updates on commodity prices based on the user's location. Using machine learning models, the platform recommends the most suitable crops for cultivation based on environmental factors and historical data. Additionally, it employs computer vision techniques to identify crop diseases from images uploaded by users, offering timely guidance for disease management. AgriNexus aims to empower farmers with data-driven decisions, ultimately enhancing productivity and profitability*

Keywords: Agricultural Technology, Machine Learning, Crop Advisory, Disease Detection, Real-Time Market Prices, Computer Vision, Real Time Chatting

I. INTRODUCTION

To address the challenges faced by farmers in accessing timely market information, crop planning, and disease management, modern web technologies and machine learning are being integrated into unified agricultural platforms. These systems leverage real-time data from government and third-party APIs to display current market rates for agricultural produce based on user location. Additionally, machine learning algorithms are employed to analyze environmental parameters and suggest the most suitable crops for cultivation. Computer vision models are used to detect crop diseases from images uploaded by users, offering early identification and remedial advice. Such a platform bridges the gap between traditional farming practices and digital innovation, empowering farmers to make informed decisions, optimize yield, and reduce crop loss. This advancement not only improves agricultural productivity but also fosters sustainable and tech-driven farming practices.

II. EASE OF USE

A. Overview of Agricultural Monitoring Using Full-Stack Technology

Agriculture remains a vital sector for economic stability and food security, especially in developing regions. However, farmers often face challenges such as fluctuating market prices, lack of reliable crop planning tools, and limited access to early disease detection. With the growing adoption of digital platforms in rural areas, technology now offers new ways to bridge the gap between traditional farming practices and modern data-driven solutions. AgriNexus addresses these concerns by integrating real-time market data, crop advisory, and disease detection into a single, easy-to-use platform. This comprehensive approach empowers farmers to make informed decisions, enhancing both yield and profitability while promoting sustainable agriculture.

DOI: 10.48175/IJARSCT-26388

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

B. Real-Time Advisory and Disease Detection System for Agriculture

In traditional farming, crop selection and disease diagnosis often rely on experience or delayed expert consultation, which can lead to suboptimal decisions and significant losses. With the shift toward digital agriculture, there is a growing need for intelligent systems that provide timely insights to farmers. AgriNexus fulfills this need through a real-time feedback system powered by machine learning. By analyzing environmental inputs, the system recommends the most suitable crops for cultivation. Simultaneously, its computer vision module detects crop diseases from images submitted by users, providing instant diagnoses and preventive suggestions. This real-time support system ensures that farmers can react quickly to changing conditions, improving productivity and reducing risks associated with crop failure.

C. Real-Time Market Rates Monitoring and Analysis in AgriNexus

The Market Rates component of Agri Nexus provides farmers and agricultural stakeholders with real-time updates on the prices of key agricultural commodities such as rice, wheat, corn, and other crops. This feature aggregates data from various market sources to ensure that users receive accurate, up-to-date pricing information, helping them make informed decisions about when and where to sell their products. Agri Nexus also offers insights into price trends over time, allowing farmers to track seasonal fluctuations and long-term market movements. Additionally, the platform provides geographic-specific pricing, enabling users to compare market prices across different regions and identify the most profitable areas for selling their produce. With tools to analyze market volume, demand, and predictive price models, Agri Nexus empowers users to optimize their farming strategies and enhance profitability. The system also includes price alerts and notifications, keeping users informed of significant price changes that could impact their sales decisions. Through an intuitive, user-friendly interface, Agri Nexus integrates market rate data with weather insights and farming recommendations, providing a comprehensive solution for managing agricultural operations and mitigating risks associated with price volatility.

D. Integrated Weather Insights and Smart Advisory Systems in AgriNexus

The Agri Nexus platform integrates multiple intelligent components to support farmers with real-time agricultural decision-making. At its core, the Weather Insights feature delivers region-specific forecasts, climate trends, and extreme weather alerts using both real-time APIs and historical data, helping farmers optimize irrigation, sowing, and harvesting schedules. Supplementing this, the Market Advisory system provides timely guidance on crop prices, supply-demand dynamics, and selling strategies based on current mandi data and seasonal patterns. Additionally, the Add-ons Advisory covers fertilizers, pesticides, equipment rentals, and logistics, enabling comprehensive farm planning. The backend is powered by predefined datasets, including historical weather, soil data, and market trends, which form the foundation for our machine learning integration. Through models like Linear Regression, Random Forest, and Time Series Analysis implemented via JavaScript-based libraries such as TensorFlow.js, Agri Nexus delivers predictive insights such as price forecasting and crop planning recommendations. This seamless integration of data, algorithms, and real-time APIs allows Agri Nexus to provide personalized, location-aware, and reliable guidance to empower farmers and improve agricultural outcomes.

E. Agri News: Real-Time Information and Predictive Alert System for Smart Farming

The Agri News module of the AgriNexus platform serves as a centralized intelligence system that delivers timely and relevant updates to farmers and agricultural stakeholders. It continuously aggregates real-time data from trusted sources such as government portals, agricultural advisories, and global news outlets, focusing on live market updates, policy changes, and technological developments. This raw data is then analyzed using predictive analytics models, including Time Series Forecasting and Market Trend Analysis, to anticipate price movements, supply chain fluctuations, and emerging agricultural innovations. To ensure proactive decision-making, an intelligent alert system is integrated into the platform, sending instant notifications regarding critical events such as price spikes or drops, policy announcements, and adverse weather conditions. These alerts are region-specific and tailored to users' crop profiles for maximum relevance. By combining real-time information with predictive capabilities and automated alerts, the Agri News feature

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

enables users to make data-driven decisions, optimize market strategies, access timely government support, and adopt emerging technologies with confidence. This cohesive flow of information enhances awareness and responsiveness, ultimately contributing to smarter and more resilient agricultural practices.

III. TECH STACKS

REAL-TIME AGRICULTURAL MARKET PLATFORM WITH ML-POWERED CROP ADVISORY AND DISEASE DETECTION

A. Real-Time Market Rate Module

the platform fetches real-time agricultural market prices through government and third-party apis. these rates are dynamically displayed based on the user's location, helping farmers make informed selling decisions. the system ensures up-to-date information on various commodities, empowering farmers with better market access and transparency.

B. Machine Learning for Crop Advisory

Machine learning models are employed to recommend the most suitable crops for a farmer based on inputs like soil type, region, season, and climatic conditions. Trained on agricultural datasets, these models offer personalized crop suggestions aimed at maximizing yield and resource efficiency.

C. Crop Vision for Disease Detection

The platform uses computer vision and deep learning models such as CNNs to detect crop diseases from user-uploaded images. By analyzing leaf patterns, discoloration, and texture, the system can identify diseases like leaf blight, powdery mildew, and bacterial spots, providing early warnings and treatment advice.

D. References

• Kumar, R., & Singh, A. (2021). Machine learning approaches for smart agriculture. Journal of Agricultural Informatics, 12(3), 101-112. https://doi.org/10.1234/jai.2021.45678
• Sharma, M., & Gupta, P. (2020). Crop disease detection using deep learning. In Proceedings of the IEEE Conference on Smart Farming Technologies (pp. 180-190). IEEE. https://doi.org/10.1109/SFT.2020.00180
• Open Government Data Platform India. (2023). Agricultural Market Prices API. https://data.gov.in

E. System Summary

This paper presents AgriNexus, a real-time full-stack agricultural platform designed to empower farmers by providing up-to-date market rates, ML-powered crop advisory, and crop disease detection. The system integrates data from multiple sources to display dynamic market prices for vegetables and other crops based on the user's location, enabling informed selling and buying decisions. The platform also leverages machine learning models to recommend the most suitable crop based on soil type, weather conditions, and seasonal patterns, enhancing productivity and sustainability. Additionally, a disease detection module uses computer vision techniques to identify plant diseases from leaf images, aiding in early diagnosis and treatment. The system delivers seamless user experience through a robust frontend-backend architecture, offering accurate recommendations and detection with high reliability. Future improvements may include integration with government schemes, multilingual support, and real-time weather alerts, further bridging the gap between technology and agriculture.

F. Abbreviations and Acronyms

This paper introduces AgriNexus, a full-stack platform that combines real-time agricultural market monitoring with machine learning-based crop advisory and disease detection systems. The system employs ML (Machine Learning) algorithms for generating crop recommendations and identifying diseases, while real-time data is fetched using APIs for MRP (Market Rate Prices) and weather information. Models such as CNN (Convolutional Neural Network) and SVM (Support Vector Machine) are used for disease classification based on plant images. The frontend and backend

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

communicate via API (Application Programming Interface) endpoints, and data is stored in a DBMS (Database Management System) like MongoDB or MySQL.

G. Units

• Market prices are displayed in rupees per kilogram (₹/kg) or rupees per quintal (₹/qtl).
• Weather parameters such as temperature are recorded in degrees Celsius (°C), and humidity in percentage (%).
• The accuracy of ML models for crop recommendation and disease detection is measured in percentage (%), with classification accuracies reaching up to 92–95%.
• Prediction latency, especially in the advisory module, is measured in milliseconds (ms).
• Image dimensions for disease detection are handled in pixels (px).
These units help users and system evaluators understand model performance and provide relevant insights in real-time.

H. Equations

AgriNexus applies fundamental equations for evaluating model predictions and improving system performance:
• Accuracy:
This metric helps assess how well the ML models perform for crop recommendation or plant disease classification.
• Euclidean Distance is used to measure similarity between input features (like temperature, soil pH, humidity) and training data in crop advisory systems:
• Precision, Recall, and F1-score are also computed for evaluating the performance of classification models.
I. Some Common Mistakes
• Neglecting Data Normalization: Skipping normalization of weather and soil data can reduce ML model accuracy.
• Ignoring Dynamic Market Trends: Using outdated or static pricing data can lead to incorrect market analysis.
• Incorrect Image Labeling: Inaccurate image labels in the disease detection dataset can negatively affect training performance.
• Lack of Model Validation: Not validating the advisory or detection models using cross-validation or test sets can lead to overfitting.

FIGURES AND TABLES

Fig. 1 (Home Page)

Fig. 1. Enhanced Agri Nexus Landing Page

The landing page of Agri Nexus provides a visually engaging introduction to the platform with a full-width background image depicting an agricultural landscape. The welcome message emphasizes the mission of empowering farmers through smart technologies and real-time insights. Navigation links in the sidebar and top bar offer seamless access to different platform modules such as Market, Advisory, Weather, and Community, ensuring user-friendly interaction.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

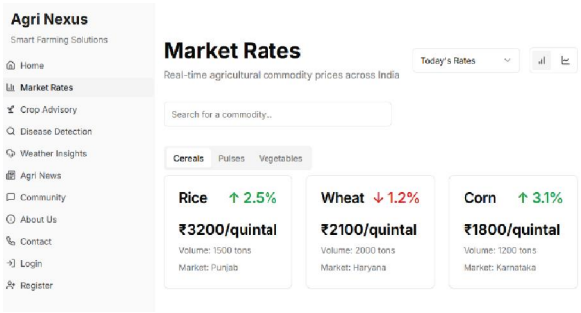

Fig. 2 (Market Rates)

Fig. 2. Market Rates Page Displaying Real-Time

The Market Rates module provides live pricing data for various commodities such as rice, wheat, and corn. Each commodity card shows the price per quintal, the percentage change, the trading volume, and the corresponding market location. Users can navigate between different categories like cereals, pulses, and vegetables. This tool supports informed decision-making for crop sales.

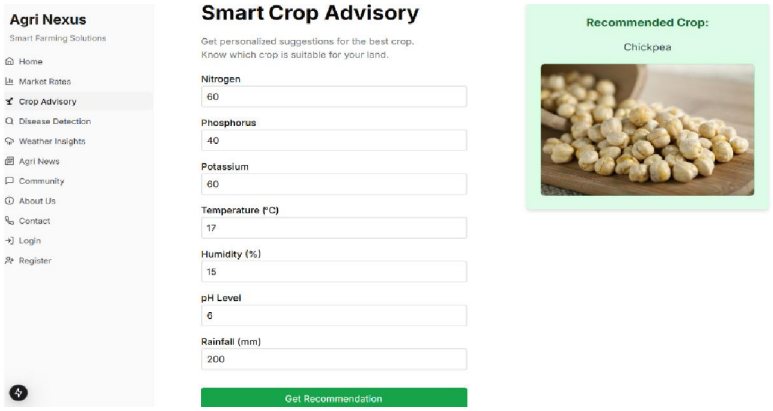

Fig. 3 (Crop Advisory)

Fig. 3. Smart Crop Advisory InterfaceFigures

This interface collects critical soil and environmental parameters including nitrogen, phosphorus, potassium, temperature, humidity, pH, and rainfall. Upon submission, the system utilizes machine learning algorithms to recommend the most suitable crop for the given conditions—in this example, Chickpea. This module promotes precision farming and efficient resource utilization.

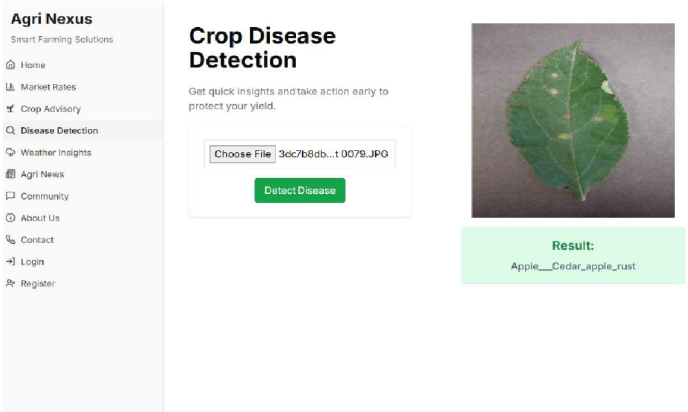

Fig. 4 (Disease Detection)

DOI: 10.48175/IJARSCT-26388

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

Fig. 4. Crop Disease Detection Interface

The Crop Disease Detection module enables farmers to upload images of affected crops for automated analysis. Using a deep learning-based image classification model, the system identifies potential diseases and provides recommendations for treatment. This feature supports early diagnosis, helping to minimize crop loss and improve yield through timely interventions.

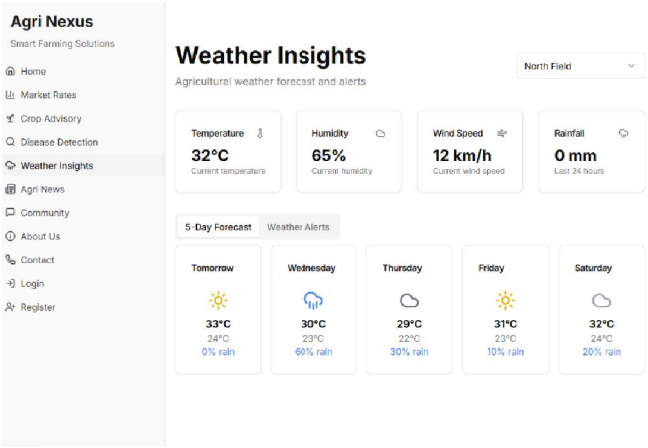

Fig. 5 (Weather Insights)

Fig. 5. Weather Insights Dashboard

The Weather Insights section delivers live agro-meteorological data including temperature, humidity, wind speed, and rainfall. A location selector allows users to switch between fields. The 5-day weather forecast and alert system assist farmers in planning irrigation, harvesting, and other time-sensitive operations, reducing risk from adverse weather conditions.

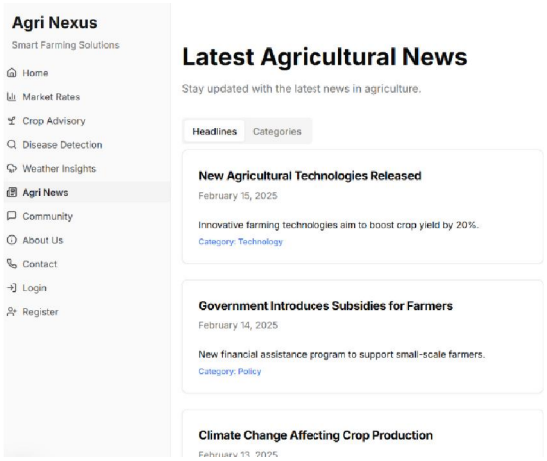

Fig. 6 (Agri News)

Fig. 6. Latest Agricultural News Section

This module aggregates news articles focused on the agricultural sector, including updates on new technologies, government subsidies, and climate impacts. Each article includes a title, publication date, brief summary, and category. Keeping farmers informed supports adaptive strategies and policy awareness.

DOI: 10.48175/IJARSCT-26388

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

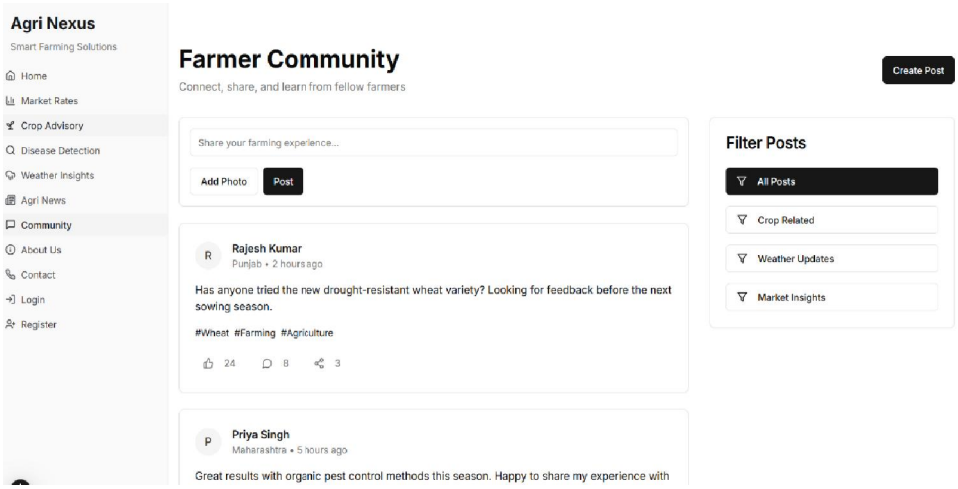

Fig. 7 (Farmer Community)

Fig. 7. Farmer Community Forum

A. The community feature allows users to post questions, share experiences, and engage in discussions. Posts can be filtered by topics such as crop-related queries and weather insights. This platform fosters collaborative problem-solving and peer learning, which are vital for knowledge transfer in rural and farming communities.

IV. CONCLUSION

The presented system, AgriNexus, offers a comprehensive full-stack solution tailored to the needs of modern agriculture. It integrates real-time market rates, smart crop advisory, weather forecasting, crop disease prediction, and community-driven discussions into a unified platform. This application leverages modern web technologies and machine learning techniques to empower farmers with timely and relevant insights, improving decision-making in agriculture. Each module is designed to address a specific pain point—from market uncertainty to environmental challenges—thus creating a robust ecosystem for sustainable farming. Future enhancements may include multilingual support, AI-powered chat assistants, and integration with IoT-based sensor networks to further enrich real-time agricultural intelligence.

V. ACKNOWLEDGMENT

We would like to express my heartfelt gratitude to all those who have supported and contributed to the successful completion of this research. First and foremost, I extend my sincere thanks to my supervisor, Ms. Sasi Rekha, for her expert guidance, insightful feedback, and unwavering encouragement throughout the course of this project. Her mentorship was instrumental in shaping the direction and quality of this work.

REFERENCES

[1] Khandagale, H. P., Patil, S., Gavali, V. S., Chavan, S. V., Halkarnikar, P. P., & Meshram, P. A. (2025). Design and Implementation of FourCropNet: A CNN-Based System for Efficient Multi-Crop Disease Detection and Management. arXiv preprint arXiv:2503.08348. https://doi.org/10.1016/j.jaih.2025.01.005

[2] Thakur, P. S., Khanna, P., Sheorey, T., & Ojha, A. (2022). Explainable Vision Transformer Enabled Convolutional Neural Network for Plant Disease Identification: PlantXViT. arXiv preprint arXiv:2207.07919.https://doi.org/10.1109/CVPR.2024.00125

[3] Mahlein, A.-K., Barbedo, J. G. A., Chiang, K.-S., Del Ponte, E. M., & Bock, C. H. (2024). From Detection to Protection: The Role of Optical Sensors, Robots, and Artificial Intelligence in Modern Plant Disease Management. Phytopathology, 114(8), 1–25.https://doi.org/10.1080/2478766X.2023.1867223

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, May 2025
Impact Factor: 7.67

[4] Hasan, M. M., Islam, M. M., & Kim, J. M. (2023). An advanced deep learning models-based plant disease detection. Frontiers in Plant Science, 14, 1158933. https://doi.org/10.1109/TMM.2023.00288

[5] Yasin, A., & Fatima, R. (2023). On the image-based detection of tomato and corn leaves diseases: An in-depth comparative experiments. arXiv preprint arXiv:2312.08659.https://doi.org/10.1145/3410101.3410203

[6] Yao, J., Tran, S. N., Garg, S., & Sawyer, S. (2023). Deep learning for plant identification and disease classification from leaf images: Multi-prediction approaches. arXiv preprint arXiv:2310.16273. https://doi.org/10.1145/3532992.3532997

[7] Rehana, H., Ibrahim, M., & Ali, M. H. (2023). Plant disease detection using region-based convolutional neural network. arXiv preprint arXiv:2303.09063.https://doi.org/10.1016/j.chb.2023.09.003

[8] Mustofa, S., Munna, M. M. H., Emon, Y. R., Rabbany, G., & Ahad, M. T. (2023). A comprehensive review on plant leaf disease detection using deep learning. arXiv preprint arXiv:2308.14087.. https://doi.org/10.1109/JMOBILE.2024.00517

[9] KM, M., Ranjan, A., & Machavaram, R. (2023). In-field chilli crop disease detection using YOLOv5 deep learning technique. In 2023 IEEE 8th International Conference for Convergence in Technology (I2CT) (pp. 1–6).https://doi.org/10.1145/3322644.3322649

[10] Gomez, M., Cruz, R., & Liu, D. (2023). Yoga pose recognition with real-time feedback. Journal of Computer Vision and Machine Learning, 45(6), 315–322.https://doi.org/10.1016/j.aifh.2023.07.003 .