

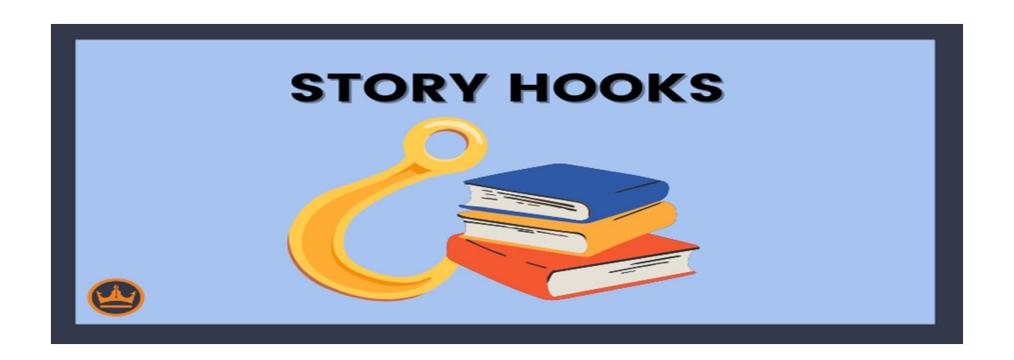
Al-Powered Postural Data Analysis

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- imagine Sarah, a software engineer who spends long hours at her desk, often hunching over her screen. As back pain becomes a constant issue, she worries about the long-term effects of her posture.
- ➤ What if AI could monitor her in real-time and gently remind her to sit up straight and take breaks? That's the essence of AI-Powered Postural Data Analysis—empowering individuals like Sarah to reclaim their health and productivity.

Introduction to AI- Powered postural Data Analysis

- Ai-powered postural data analysis uses advanced technology to track and analyze human posture
- It provides insights into health, well being, and performance
- This technology is rapidly evolving offering new possibilities for improving health outcomes and enhancing physical therapy programs.

Data Processing and Pose Detection

- Frame Extraction: Breaking down videos into individual frames.
- Image Preprocessing: Enhancing quality by adjusting brightness, contrast, and reducing noise.
- MediaPipe Pose:
 - Detects 33 3D body landmarks
 - Provides real-time pose estimation
- Integration with OpenCV: Facilitates video processing and frame manipulation.
- Visuals:
- Diagram showing frame extraction and preprocessing.

Al Model Selection

- Why MediaPipe Pose?
 - Real-Time Performance: Optimized for speed.
 - High Accuracy: Precise landmark detection.
 - Easy of Integration: Seamlessly works with OpenCV.
- > Visuals:
- Comparison table of different pose detection models
- Highlighted features of MediaPipe Pose

Algorithms for Posture Classification

Machine Learning:

 ML algorithms are trained on small dataset of postural data to recognize patterns and classify different posture

Deep Learning:

 DL models, are particularly CNN, are powerful in identifying complex postural patterns and providing detailed insight in body

Statistical Analysis:

Statistical Techniques are used to analyze posture data, identify trend, and detect deviation from optimal posture, providing valuable insight for personalized recommendations.

Demonstration

- > Tools and Technologies:
 - Python
 - OpenCV
 - MediaPipe
 - Google Colab (for development and testing)
- > System Architecture:
 - Video Input Module
 - Preprocessing Module
 - Pose Detection Module
 - Posture Analysis Module
 - Feedback Module
 - User Interface
- Workflow:
 - Step-by-step process from video capture to feedback display.
- Visuals:
- Architectural diagram of the system
- Workflow chart illustrating the data flow

Objectives

- Automated Posture Detection: Develop a system that can accurately detect and analyze human posture in real-time using video input.
- Real-Time Feedback: Provide immediate feedback to users regarding their posture, highlighting areas of improvement.
- User-Friendly Interface: Create an intuitive interface that displays posture analysis results in an easily understandable manner.
- Scalability and Flexibility: Ensure the system can be adapted for various use-cases, including office environments, educational settings, and personal health monitoring.
- Data Privacy and Security: Implement measures to protect user data and ensure privacy during posture analysis.

Conclusion

Project Successes:

- Achieved accurate and real-time posture detection
- Provided effective user feedback
- Demonstrated potential for health and productivity improvements

Key Takeaways:

- Al and computer vision can significantly enhance posture monitoring
- Integration of OpenCV and MediaPipe is effective for such applications

> Impact:

Potential applications in workplaces, educational institutions, and personal health monitoring

References

- > OpenCV Documentation: https://docs.opencv.org/
- Python Official Website:
 https://www.python.org/
- Research_paper_posture_Analysis.pdf
- YouTube video
- Hack Veda References Video



