Summary Report

OpenPosture: Detection/Correction of Posture using OpenPose

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**Introduction:**

The Seated Posture Recognition System uses real-time object detection via OpenCV and a trained Keras model to address the health risks related to bad sitting posture. With the use of an intuitive interface that offers tailored recommendations based on the alignment of important body parts, the objective is to evaluate and enhance users' sitting posture.

**Components:**

* Keras Model: The back, hands, neck, and feet are among the key points on the human body that the system can identify using a Keras model that is based on a VGG-like architecture. Through a multi-stage approach to iterative refinement, this model improves posture estimate accuracy by gradually improving predictions.
* Dataset creation: To train and test the Seated Posture Recognition System, a comprehensive dataset of 144 photos was carefully selected to ensure its efficacy in a variety of circumstances and to improve the system's accuracy in identifying the best seated postures.
* Real-time Object Detection: OpenCV is used to detect objects in real-time, expanding the capabilities of the system beyond posture recognition. Because of this functionality, the system can recognize different user-defined scenarios and specific objects or postures in real-time.
* User Interface: The system's frontend, which was created with Vue.js, offers users an easy-to-use interface for tracking their posture status. The ability to readily examine one's neck, feet, knees, and back alignment encourages users to actively participate in improving their sitting habits.
* Backend Services: Firebase acts as the backend, providing hosting, authentication, cloud functions, and real-time NoSQL database storage through Firestore. By streamlining backend development, this integration frees up developers to concentrate on improving the user interface and overall experience.
* Workout Recommendations: After the user’s real time posture is identified, the User Interface will list the user’s postural elements from their photo submission or the average of their real time video postural positions. Once the postural elements are identified, the user interface will provide the user with one or multiple workout recommendations for each posture.
* Login: As OpenPosture is a subscription based service that charges $10 per month, a login will be required to validate that the subscription has adequately been purchased.

**Functionality:**

The OpenCV model analyzes side images of people to identify kneeling, folded or unfolded hands, and back posture (straight, hunched back, or reclining). Concurrently, real-time object identification with OpenCV broadens the system's scope by allowing it to recognize particular objects or poses that are pertinent to the user.

**Benefits:**

After having their back, feet, knees, and neck alignment evaluated, users receive tailored recommendations for better posture. By encouraging good sitting practices, the system lowers the chance of neck and back pain as well as other negative health effects linked to bad posture. Reduced back and neck pain creates more productive workers and students and thus leaves more room for innovation and learning!

**Future Enhancements:**

Using OpenCV to add real-time object detection to the system's capabilities is an intriguing new direction for development. A more thorough grasp of the user's surroundings would be possible if this functionality were integrated into the system, enabling it to recognize and offer insights about particular objects or postures during current operations. Currently, OpenPosture requires a second device that the user must physically place laterally to their desk. The OpenPosture tool does not currently offer any insight as to how to position the camera in a way that ensures the user’s entire lateral body is adequately positioned in the camera. Ongoing improvement and optimization in addition to the incorporation of real-time object detection will make the system more flexible and successful in a variety of situations, guaranteeing a more adaptable solution for customers who want to maintain healthy sitting postures and general wellbeing.

**Conclusion:**

In summary, the Seated Posture Recognition System, leveraging the strengths of OpenCV, offers a novel solution to health issues linked with improper sitting posture. Its intuitive interface and tailored recommendations make it a valuable resource for individuals seeking to enhance their sitting habits, reducing the risk of pain and health problems associated with poor posture.