Test of Gross Motor Development: Evaluation through AI Image Processing and Wearable Sensors

Li, Emma (School: Shanghai High School International Division)
Li, Sophie (School: Shanghai High School International Division)

The goal of this project is to automize the Test of Gross Motor Development (TGMD) so that it can be widely applied in schools and potentially benefit billions of children. Gross motor development is critical in children's ontogenesis as it affects not only life-long fitness and health but also language and cognitive development. For years, health professionals have been calling for universal testing in schools to allow for early identification and effective treatment of gross motor deficiency. However, this has not been feasible because it would involve an impractical amount of training and testing for specialized health professionals. Our project explores two ways to automize the test: AI image processing and wearable sensors. For the AI approach, we developed algorithms to analyze the postures of movements based on joints coordinates extracted using human pose estimation algorithms. For the wearable sensors approach, sensors such as gyroscopes, potentiometers, and force sensitive resistors were used for motion evaluation via the Arduino Platform. Overall, the AI approach achieved 92% accuracy and wearable sensors 85% accuracy in the evaluation of the running movement. The same framework can be applied to the remaining movements of the test. Comparing the two, AI is more suitable for wide-scale application due to its lower marginal cost, higher stability, and less interference with children's movements. In conclusion, our research shows great promise in automizing the test to make school-based universal screening possible, benefiting many more children, particularly the socio-economically disadvantaged.

Awards Won:
Fourth Award of $500