PROGRESS REPORT

By Samuel Kamau, 22/04/2023

1. Summary of work completed to date / progress:

* Implemented a Python algorithm using OpenCV, Mediapipe, and TensorFlow to detect cycling posture and technique in real-time from video.
* Used the algorithm to analyze cycling posture and technique and detect common errors such as incorrect elbow, hip, and knee angles and wrist flex.
* Validated the algorithm's output using visual inspection and feedback from a small group of cyclists.
* Optimized the algorithm's hyperparameters to improve its performance on the test dataset.

1. Summary of work in flight:

* Analyzing the algorithm's performance on different types of bicycles and in various lighting conditions and camera angles.
* Adding a more interactive and intuitive UI to better improve user experience
* Comparing the algorithm's performance to existing tools for analyzing cycling posture and technique.
* Conducting a longitudinal study to assess the algorithm's long-term impact on improving cycling posture and technique.

1. Summary of work planned in future:

* Collecting a diverse dataset of cycling videos to test the algorithm's performance on different cycling styles and body types.
* Using an objective measure of posture and pedaling technique such as motion capture or force plates to validate the algorithm's output.
* Conducting a pilot study with a larger group of cyclists to obtain feedback on the algorithm's usability, accuracy, and effectiveness in improving posture and pedaling technique.
* Analyzing the algorithm's performance in terms of its ability to detect and correct common posture and pedaling errors.
* Optimizing the algorithm's hyperparameters such as the detection confidence thresholds and the scale factor to achieve the best performance on the dataset.
* Evaluating the algorithm's performance under different lighting conditions and camera angles to ensure its robustness.
* Testing the algorithm's performance on different types of bicycles such as road bikes and mountain bikes to ensure its generalizability.
* Collecting user feedback on the algorithm's usability, accuracy, and effectiveness and using it to further optimize and improve the algorithm.