

This branch is 1 commit behind [claudiunz/tnwahi-appakrcs:main](#).

bbacic Update README.md	ba0c31b · 9 months ago	
LICENSE	Initial commit	10 months ago
README.md	Update README.md	9 months ago
main.py	Create main.py	10 months ago

About

Initial project fork (from <https://github.com/claudiunz/MR-video-processing>), set after CITISIA 2024 conference with the credits included. Caveats: No install requirements.txt file provided (see README.md file). This is the second part of video processing flow (see referenced CITISIA 2024 paper [1]).

[#artificial-intelligence](#) [#feature-extraction](#)

Augmenting Knee Rehabilitation Replays Using MediaPipe Pose Estimation

- [#rehabilitation-system](#)
- [#privacy-preserving-computing](#)
- [#technology-for-better-life-comfort](#)
- [#exercise-monitoring](#)
- [#technology-for-social-good](#)
- [#human-motion-modelling-and-analysis](#)
- [#augmented-video-analysis](#)

Overview

This project implements a methodology for analysing knee angles from video footage using MediaPipe Pose [#acc-new-zealand](#) provides near real-time visualisation and analysis of knee movements, supporting both front-view and side-view perspective [#diagnostic-information-extraction](#)

Note

Near real-time visualisation of MP4 videos depends on the computer specification.
Hint: If using a decade old laptop for fast scrolling and A-B sequence analysis, consider capturing first a screenshot of the generated augmented video replay.

As a stand-alone application, this source code is the second part of the three stage processing workflow, which is also a part of its parent project codebase [\[1\]](#) intended for home use and advancements of near-future analytical healthcare systems. See more: "Towards nation-wide analytical healthcare infrastructures: A privacy-preserving augmented knee rehabilitation case study" [\[1\]\[2\]](#)

Readme

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Academy

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Features

- Near real-time knee angle detection and measurement
- Support for both left and right knee analysis
- Front-view and side-view analysis capabilities
- CSV export of tracking data
- Real-time visualization with angle plots
- Incorrect knee movement detection

Releases

No releases published

Packages

No packages published

Languages

● Python 100.0%

Requirements

- Python 3.8+
- OpenCV
- MediaPipe
- Matplotlib
- NumPy

Installation

If running the project on a computer with Python and OpenCV installed, install Google MediaPipe by:

```
pip install mediapipe
```



or by preparing your own `requirements.txt` for project deployments on multiple machines of similar specifications:

```
pip install -r requirements.txt
```



Usage

To run this application, at `Windows` Command Prompt, or in `MacOS / Linux` Terminal, use the following syntax:

```
python main.py video_file output_csv [--export_knee {left,right,both}] [--direction {left,right,forward}]
```



Arguments

`video_file`: Path to input video file
`output_csv`: Path for output CSV file
`--export_knee`: Specify which knee to analyze (default: both)
`--direction`: Override foot direction detection

Citation

If using our code, algorithms or models for your research, please cite [\[1\]](#) or use BibTeX format:

```
@inproceedings{bbacic2024simple,  
  author={Bačić, Boris and Vasile, Claudiu and Feng, Chengwei and Ciucă, Marian},  
  title={Towards nation-wide analytical healthcare infrastructures: A privacy-preserving augmented knee rehabilitation case study},  
  booktitle = {Conference on Innovative Technologies in Intelligent Systems & Industrial Applications (CITISIA 2024)},  
  year = {2024}  
  pages={10},  
  date = {13-15 Dec.},  
  address = {Sydney, NSW},  
}
```



If using `LaTeX` or `Overleaf`, to preserve Unicode/special characters, a recommended BibTeX format is:

```
@inproceedings{bbacic2024simpleTeX,  
  author={Ba{\v{c}}i{\'{c}}, B and Vasile, C and Feng, C and Ciuc{\u{a}}, M},  
  title={Towards nation-wide analytical healthcare infrastructures: A privacy-preserving augmented knee rehabilitation case study},  
  booktitle = {Conference on Innovative Technologies in Intelligent Systems & Industrial Applications (CITISIA 2024)},  
  year = {2024},  
  pages={10},  
  date = {13-15 Dec.},  
  address = {Sydney, NSW},  
}
```



Contributors

Contributor	Description
Claudiu Vasile @claudiunz	Python code, incremental prototyping, testing, and development. Github main project tnwahi-appakrcs .
Dr Marian G. Ciucă	Computational geometry and trigonometric equations for knee angle calculations.
Chengwei Feng	Dataset labelling verification, models and code templates alternatives.
Dr Boris Bačić @bbacic	Project leader, supervision, codebase development, testing, reviewing, and integration [1] . GitHub project reviewer and co-contributor. ¹⁾

¹⁾Note: <https://github.com/bbacic/tnwahi-appakrcs/> is a contributing fork of [tnwahi-appakrcs](#).

Version History of the [tnwahi-appakrcs](#) Project

Version	Date	Summary/Action/Rationale/Acknowledgements	Project/File name
3.2	Dec 2024	CITISIA 2024 publication [1] . Refinements, issues and bug fixes of PoC (ver. 3) for the scope of the publication.	main.py
3	Nov 2024	Front and side camera view with extended diagnostic information processing (from ver. 2 PoC).	main.py <- script.py
2	May 2024	Privacy-preserving augmented video analysis with diagnostic information streaming and visualisation (PoC).	script.py
1	Aug 2023	General project prototyping and investigations. Beta version of proof-of-concept (PoC).	script.py

Reference

- Bačić, B., Claudiu Vasile, Feng, C., & Ciucă, M. G. (2024, 13-15 Dec.). *Towards nation-wide analytical healthcare infrastructures: A privacy-preserving augmented knee rehabilitation case study*. Presented at the meeting of the Conference on Innovative Technologies in Intelligent Systems & Industrial Applications (CITISIA 2024), Sydney, NSW. [In print]. [DOI](#) [DOI](#)² [DOI](#)³ [DOI](#)⁴ [DOI](#)⁵
- Bačić, B., Claudiu Vasile, Feng, C., & Ciucă, M. G. (2024, 13-15 Dec.). *Towards nation-wide analytical healthcare infrastructures: A privacy-preserving augmented knee rehabilitation case study*. Presented at the meeting of the Conference on Innovative Technologies in Intelligent Systems & Industrial Applications (CITISIA 2024), Sydney, NSW. [ArXiv.org preprint]. Accessed 31 Dec. 2024 at: <https://arxiv.org/abs/2412.20733>. [DOI](#)