Delft University of Technology

Advancing Analysis Techniques for Plantar Pressure Videos via Open-Access Contributions

Booth, Brian G.; Keijsers, Noël L.W. ; Huysmans, Toon; Sijbers, Jan

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

ADVANCING ANALYSIS TECHNIQUES FOR PLANTAR PRESSURE VIDEOS VIA THE CAD WALK OPEN-ACCESS DATABASE

Brian G. Booth⋆, Noël L.W. Keijsers†, Toon Huysmans‡,⋆, Jan Sijbers⋆

⋆ imec-Vision Lab, Department of Physics, University of Antwerp, Belgium
† Department of Research, Sint Maartenskliniek, The Netherlands
‡ Section on Applied Ergonomics & Design, Department of Industrial Design Engineering,
Delft University of Technology, The Netherlands

ABSTRACT

While dynamic plantar pressure measurements are commonly used for clinical evaluation of gait-related problems, computational analysis techniques for these datasets are few and far between. To address this issue, we introduce an open-access database of plantar pressure videos for researchers to develop algorithms around.

Index Terms— Plantar pressure, database, biomechanics

1. INTRODUCTION

When examining foot and ankle complaints, it is becoming customary to acquire pressure measurements from the plantar surface of a patient's foot. While such a measurement produces a detailed video of the patient's footstep, there is a lack of analysis techniques that can fully exploit the data contained therein [1]. The goal of this abstract is to engage the medical image analysis community and to stimulate the development of computational analysis techniques for plantar pressure videos. To achieve this goal, we introduce the first open-access database of plantar pressure videos. Our open-access plantar pressure video database is part of the CAD WALK project and available at `https://zenodo.org/communities/cad-walk`. Others can also contribute to the database by contacting the first author at brian.booth@uantwerpen.be.

2. DATA COLLECTION

The CAD WALK database currently consists of two datasets, one containing plantar pressure videos from 55 healthy controls, and a second containing videos from 16 Hallux Valgus patients. Additional data from Hallux Valgus patients, as well as data from ACL rupture patients, are currently being collected and will be added to the database in the near future.

All data was collected from calibrated footscan® pressure-sensing plates (rs scan, Paal, Belgium) with a spatial resolution of 7.62 mm × 5.08 mm, and a minimum measurement frequency of 200 Hz. The resulting plantar pressure videos are provided in NIfTI format.

Additionally, demographic information is also included for each participant. Their height and weight were measured, while age, sex, and shoe size were self-reported. Also, the Waterloo hand dominance and leg dominance questionnaires were used to establish a person's handedness and footedness [2]. For the Hallux Valgus patients, self-assessment scores from the Foot Function Index (FFI-5pt) [3] and the Manchester-Oxford Foot Questionnaire [4] are also provided.

3. CONCLUSION

Computational analysis techniques for plantar pressure videos currently lag behind those seen in other medical imaging domains, making it difficult to fully exploit the diagnostic capabilities of this imaging modality. To address this issue, we have created the first open-access database of plantar pressure videos and encourage medical image analysis researchers to explore this emerging research area.

4. REFERENCES

[1] B. G. Booth, N.L.W. Keijsers, J. Sijbers, and T. Huysmans, "STAPP: spatiotemporal analysis of plantar pressure measurements using statistical parametric mapping," *Gait & Posture*, vol. 63, pp. 268–275, 2018.

[2] L. J. Elias, M. P. Bryden, and M. B. Bulman-Fleming, "Footedness is a better predictor than is handedness of emotional lateralization," *Neuropsychologia*, vol. 36, no. 1, pp. 37–43, 1998.

[3] M. M. Kuyvenhoven, P. Zuithoff K. J. Gorter, E. Budiman-Mak, K. J. Conrad, and M. W. M. Post, "The foot function index with verbal rating scales (FFI-5pt): A clinimetric evaluation and comparison with the original FFI," *Journal of Rheumatology*, vol. 29, no. 5, pp. 1023–1028, 2002.

[4] D. Morley, C. Jenkinson, H. Doll, G. Lavis, R. Sharp, P. Cooke, and J. Dawson, "The Manchester-Oxford foot questionnaire (MOXFQ): Development and validation of a summary index score," *Bone & Joint Research*, vol. 2, no. 4, pp. 66–69, 2013.