Patrícia **Bota**

Machine Learning Engineer · PhD

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Summary

PhD finalist in Biomedical Engineering at Univ. of Lisbon (ULisboa), Instituto Superior Técnico (IST) and researcher at Instituto de Telecomunicações (IT), with around 6 years of research experience.

My PhD focused on developing artificial intelligence algorithms for emotion recognition from physiological signals, which resulted in a strong publication record with 10+ papers in peer-reviewed journals (8 in Q1, 2 in Q2, 3 under revision).

Additionally, my PhD journey has been marked by contributions to over 15+ collaborations (6 international, 9 national), 5+ workshops (including a NATO talk), and 5+ scientific fairs.

Besides scientific output, my work includes the end-to-end development of EmotiphAI, a platform for group physiological data collection in an audience, showcased at the 2019 WebSummit, at the European Commission's Resonances III Fest. and an online theatre in collaboration with Univ. Tartu. This project underlined my multi-faced skills in software architecture, front-end and back-end, and reflected my commitment to learning and applying new technologies.

Experience

Instituto de Telecomunicações

Lisbon, Portugal

Biomedical Eng. PhD Student | Researcher — *Jan. 2019 - Present*

Emotion Recognition

- Developmed Machine Learning algorithms for emotion recognition based on multimodal physiological data with superior to comparable results to the state-of-the-art for selected datasets (SJR: Q2; IF: 3.847 [1]). Survey of the field (SRJ: Q1; IF: 3.9 [2]).
- Developed feature extraction libraries (time, frequency, time-frequency, cepstral, phase-space) available at BioSPPy, a Python toolbox for biosignal processing (SRJ: Q2; IF: 3.4 [3], under review).
- Created a real-world dataset for group emotion recognition based on physiological data, containing 31 movie sessions, 380+ hours of data from over 190 subjects. (SJQ: Q1; IF: 9.8 [4]).

Back-end Development

- Developed of WiFi and Bluetooth communication module for group data collection and storage using: ScientISST, BITalino, BITalino R-IoT, and FMCI XinhuaNet devices. Reported multimodal physiological data collection using 20 devices at 25 Hz and 10 devices at 60 Hz (SJR: Q1; IF: 5.606 [5]).

Front-end Development

- Developed an user graphical interface to observe and annotate physiological data in real-time (SJR:Q1; IF: 13.99 [6], under review).

MSc and BSc Students Supervision

- Co-supervised over 3 MSc thesis and 9 BSc projects. Four papers published (2 Q1, 1 Q1 under revision and 2 Int'l Conf.).

ScientISST - Biomedical Engineering Student Group

Lisbon, Portugal

Logistics Coordinator — *Jan. 2022 - Present*

Operations Coordinator

- Managed the instrumentation inventory.

Outreach

- Organized and participated in 10+ outreach activities (scientific fairs, instagram posts, lab visits).

Centrum Wiskunde & Informatica

Amsterdam, Netherlands

Visiting Student working on Emotion Recognition using Deep Learning — *Jan. 2022 - Jul. 2022*

- Developed novel interpersonal weighted group synchrony approach for emotion recognition, surpassing previous work for K-EmoCon dataset on arousal, and providing a new baseline on AMIGOS for long-videos (SJR:Q1; IF: 13.99 [7]).

Fraunhofer Portugal

Lisbon, Portugal

Research Assistant on Machine Learning — *Feb. 2018 - Jan. 2019*

- Implemented Semi-Supervised Active Learning for Human Activity Recognition algorithms based on smartphone inertial sensors, reducing the annotated data by 89+% while maintaining an accurate performance (SJR: Q1; IF: 3.847 [8]).
- Developed TSFEL - a library for time series feature extraction and selection (SRJ: Q2; IF: 3.4 [9]).

Teaching Experience

2020-2023	**Teaching Assistant,** Machine Learning in Bioengineering. Responsible for practical lectures and group projects orientation and evaluation. Lecture on classifier fusion.	*IST | ULisboa*
2019	**Teaching Assistant,** Portfólio MEEC. Responsible for practical lectures.	*IST | ULisboa*

Education

2019 - 2024 **PhD in Biomedical Engineering,** IST | ULisboa *Lisbon, Portugal*
2013 - 2018 **Master in Biomedical Engineering,** NOVA University of Lisbon *Lisbon, Portugal*
2016 - 2017 **Erasmus,** Fachhochschule Technikum Wien *Wien, Austria*

Skills

Technical skills Python, LaTeX, Git, PyTorch, TensorFlow, Keras, Scikit-learn, Pandas, Numpy, Matplotlib, Seaborn, Linux, MAC OS
Back-end Flask, FAST API, SQLAlchemy
Front-end Javascript, HTML, CSS, Jinja2, D3, Jquery
Languages Portuguese (native), English (fluent), Spanish (reading and listening comprehension), German (beginner and eager to learn)

Collaborations

Selected Publications

- [1] **P. Bota**, C. Wang, A. Fred, and H. Silva, "Emotion assessment using feature fusion and decision fusion classification based on physiological data: Are we there yet?," Sensors, vol. 20, no. 17, p. 4723, 2020. SJR: Q2; IF: 3.847
- [2] **P. Bota**, C. Wang, A. L. N. Fred, and H. Plácido Da Silva, "A review, current challenges, and future possibilities on emotion recognition using machine learning and physiological signals," IEEE Access, vol. 7, no. 1, pp. 140990–141020, 2019. SJR: Q1; IF: 3.9
- [3] **P. Bota**, R. Silva, C. Carreira, A. Fred, and H. P. da Silva, "BioSPPy: A python toolbox for physiological signal processing," SoftwareX, vol under revision 2023. SJR: Q2; IF: 3.4
- [4] **P.Bota**, J.Brito, A.Fred, P.Cesar, and H.Silva,"A real-world dataset of group emotion experiences based on physiological data," Scientific Data, vol. in press, 2023. SJR: Q1; IF: 9.8
- [5] **P. Bota**, E. Flety, H. P. d. Silva, and A. Fred, "EmotiphAI: a biocybernetic engine for real-time biosignals acquisition in a collective setting," Neural Computing and Applications, vol. 35, no. 8, pp. 5721–5736, 2023. SJR: Q1; IF: 5.606
- [6] **P. Bota**, P. Cesar, A. Fred, and H. Silva, "Exploring retrospective annotation in long-videos for emotion recognition," IEEE Trans. on Affective Computing, vol. under revision, 2023. SJR: Q1; IF: 13.99
- [7] **P. Bota**, T. Zhang, A. El Ali, A. Fred, H. P. da Silva, and P. Cesar, "Group synchrony for emotion recognition using physiological signals," IEEE Transactions on Affective Computing, 2023. SJR: Q1; IF: 13.99
- [8] **P.Bota**, et al. "A semi-automatic annotation approach for human activity recognition." Sensors 19.3 (2019): 501. SJR: Q1; IF: 3.847
- [9] M. Barandas, D. Folgado, L. Fernandes, S. Santos, M. Abreu, **P. Bota**, H. Liu, T. Schultz, H. Gamboa "TSFEL: Time series feature extraction library." SoftwareX 11 (2020): 100456. SJR: Q2; IF: 3.4