Symbiotic AI: case studies in challenging domains

Teacher(s)
Vincenzo Dentamaro

Course description
This course will present use cases in challenging domains for symbiotic AI. The domains considered will be:

- Healthcare and well-being (e.g. SAI-based approaches for non-invasive and low-cost health monitoring of fragile people)
- Banking, Finance, and Insurance (e.g. SAI-based digital technologies for fintech and banking)
- Smart Cities, Areas and Communities (e.g. SAI-based approaches and digital solution for the safety of smart cities)
- Cultural heritage / creative industries (e.g. SAI-based approaches for the development of multiple customized tours)
- Information technology (e.g, chatbots based on SAI technologies)
- Industry and manufacturing (e.g. SAI-based control of robots in a complex industrial environment).

Course period
To be defined, mostly November-December 2023

SSD
ING-INF/05

Credits and Hours
3 CFU, 2 of lecture (8 Hours) and 1 of practice (15 hours), 31 hours

Exam Modality
1) Project. Students implement and experimentally validate an algorithm or its variation from a paper suggested by the teacher. Projects can be done in groups of 1-3 students, depending on the algorithm.

Teacher(s) CV

VINCENZO DENTAMARO received the degree in computer science from the Department of Computer Science, University of Bari, Italy and a Master Of Science in Machine Learning from Gerogia Institute of Technology Atlanta USA. PhD (cum laude) in Pattern Recognition from University of Bari Aldo Moro" with scholarship offered by InnovaPuglia S.p.A. Vincenzo is currently Assistant Professor at University of Bari Aldo Moro where he is currently publishing on various pattern

recognition journals and conferences. He has previously published about indoor positioning and localization techniques on Microsoft Research Journal and holds two international patents on localization technologies.Previous work experience at Johnson Controls Inc. as Software Engineer, IBM Rome as an intern, CEO and CTO Nextome S.R.L . Seal of Excellence European Commission, 1st prize Busan Metropolitan City (South Korea), IBM Global Mobile Innovator Tournament Award at the Mobile World Congress, MIT Technology Review award, Huawei Italy University Challenge Edge AI winner 2021.

Teacher(s) Main Publications

1. Cheriet, M., Dentamaro, V., Hamdan, M., Impedovo, D., & Pirlo, G. (2023). Multi-speed transformer network for neurodegenerative disease assessment and activity recognition. Computer Methods and Programs in Biomedicine, 230, 107344.

2. Dentamaro, V., Giglio, P., Impedovo, D., Moretti, L. and Pirlo, G. (2022). AUCO ResNet: an end-to-end network for Covid-19 pre-screening from cough and breath. *Pattern Recognition*, [online] 127. doi:10.1016/j.patcog.2022.108656.

3. Piccirelli, G., Impedovo, D., Dentamaro, V., Marani, R., Pirlo, G. and D'Orazio, T.R. (2022). Human gait analysis in neurodegenerative diseases: A review. *IEEE Journal of Biomedical and Health Informatics*, [online] 26, pp.229–242. doi:10.1109/JBHI.2021.3092875.

4. Impedovo, D., Dentamaro, V., Abbattista, G., Gattulli, V. and Pirlo, G. (2021). A comparative study of shallow learning and deep transfer learning techniques for accurate fingerprints vitality detection. *Pattern Recognition Letters*, [online] 151, pp.11–18. doi:10.1016/j.patrec.2021.07.025.

5. Convertini, N., Dentamaro, V., Impedovo, D. and Pirlo, G. (2021). Sit-to-stand test for neurodegenerative diseases video classification. *International Journal of Pattern Recognition and Artificial Intelligence*, [online] 35. doi:10.1142/S021800142160003X.

6. Convertini, N., Dentamaro, V., Impedovo, D., Pirlo, G. and Sarcinella, L. (2020). A controlled benchmark of video violence detection techniques. *Information (Switzerland)*, [online] 11. doi:10.3390/info11060321.

7. Dentamaro, V., Impedovo, D. and Pirlo, G. (2020b). Gait analysis for early neurodegenerative diseases classification through the kinematic theory of rapid human movements. *IEEE Access*, [online] 8, pp.193966–193980. doi:10.1109/ACCESS.2020.3032202.

8. Impedovo, D., Dentamaro, V., Pirlo, G. and Sarcinella, L. (2019b). TrafficWave: Generative deep learning architecture for vehicular traffic flow prediction. *Applied Sciences (Switzerland)*, [online] 9. doi:10.3390/app9245504.

9. Impedovo, D., Balducci, F., Dentamaro, V. and Pirlo, G. (2019a). Vehicular traffic congestion classification by visual features and deep learning approaches: A comparison. *Sensors (Switzerland)*, [online] 19. doi:10.3390/s19235213.

10. Dentamaro, V., Impedovo, D. and Pirlo, G. (2018). LICIC: Less important components for imbalanced multiclass classification. *Information (Switzerland)*, [online] 9. doi:10.3390/info9120317.