Curriculum Vitae - Ester Bruno

EDUCATION

- *July 2020*

  Master's Degree in Biomedical Engineering, University of Pisa, Italy, 110/110.

- *December 2019 - July 2020*

  Master Thesis in Biomedical Engineering, University of Pisa
  Thesis titled**:** "*Speech signal analysis as an aid to clinical diagnosis and assessment of mental health disorders",* carried out in collaboration with Laboratoire de Psycologie de Université de Stasbourg and Institut National de la Santé et de la Recherche Médicale (INSERM), Strasbourg, France.
  Focused on signal processing methods, the aim of the thesis was to aid clinicians in the diagnosis and monitoring mental health disorders such as bipolar disorder (BD) and Attention Deficit Hyperactivity Disorder (ADHD). The study aims at assessing at exploring whether speech features can be used to classify BD and ADHD. Starting from voice signals recorded during verbal fluency tests (VFT), speech features were extracted and investigated through unsupervised and supervised classifiers.

- February 2019 – July 2019

  Erasmus + Program, Exchange Student at the Technische Universiteit Delft, Delft, The Netherlands.

- April 2017

  Bachelor's Degree in Biomedical Engineering, University of Pisa, Italy, 97/110.

- November 2016 – March 2017

  Bachelor Thesis in Biomedical Engineering, University of Pisa.

  Thesis titled: "CLARITY vs ACT-PRESTO: characterization of the clarification methods for whole murine brains", carried out at the Interdepartmental Research Center "E. Piaggio" of Pisa.
  The aim of this thesis was to compare the performance of the two most used clarification methods (i.e. CLARITY and ACT-PRESTO) and to evaluate the optimum clearing time. Clarification methods are used to unravel mammal brain connectivity. Murine brains were clarified using both the protocols and the "goodness" of clarification was evaluated by analyzing the bulk tissue clarification index (BTCi) and the loss of protein within the tissue.

- *July 2011*

  High school diploma in Scientific High School "E. Mattei", Castrovillari (CS), Italy, 96/100

COMPETENCES

-INFORMATICS-

Programming's languages: C, C++.

Software: Microsoft Excel, Microsoft Office, Microsoft Word, Power Point, LaTeX, Matlab, Simulink, Arduino, SolidWorks, Comsol, Ansys, Abaqus, LabVIEW, BioVoice.

BioVoice

BioVoice is a multi-purpose software tool developed under Matlab at the Biomedical Engineering Lab, Firenze University. I used BioVoice for the speech signal analysis of bipolar and ADHD patients. The analysis was carried out in time and frequency domain. BioVoice first implement the selection of voiced/unvoiced audio segments and then all the features of interests are extracted from each voiced segment. In the time domain, the number and length of voiced segments, the number and length of pause segments, percentage of voiced segments and other informations are extracted. In the frequency domain, fundamental frequency (F0), formant frequencies (F1, F2, F3), noise level (Normalized Noise Energy) and jitter are estimated. For F0 and for each formant, the mean, median, standard deviation, maximum and minimum values are calculated.

Matlab

Machine learning

Supervised classifier: Support Vector Machine – Recursive Features Elimination (SVM-RFE) using LOSO (leave-one-subject-out) cross validation for the evaluation of the algorithm.

Unsupervised classifier: K-means clustering with previous dimensionality reduction performed using PCA (Principal Component Analysis).

Statistical analysis: t-test, Confusion Matrix, accuracy, MCC, F1 score.

Image processing

3D reconstruction of murine neurons.

-LINGUISTICS-

English – C1 ‖ **French** – A2

CERTIFICATES

- *November 2010*
  Trinity - Grade 8, Trinity College London, B2.2 with merit, Brighton, England.
- *March 2010*
  PET – Preliminary English Test, University of Cambridge ESOL Examinations, Grade B2, British School of English, Castrovillari (CS), Italy.

CONFERENCES

- *December 17-19, 2019*

  11th International Workshop on *Models and Analysis of Vocal Emissions for Biomedical Applications,* **MAVEBA***,* Firenze, Italy.

OTHER INFORMATIONS

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