



## Human Brain Project

Unifying our understanding of the human brain.

### Application form for the 2<sup>nd</sup> HBP Education Workshop in Lausanne, 15<sup>th</sup> to 18<sup>th</sup> March 2015 for non-HBP students

Please fill out this file and send it to: [education@humanbrainproject.eu](mailto:education@humanbrainproject.eu)

Please note that we can only accept complete applications.

Mandatory fields are marked with a \*.

<b>1. Contact details</b>
Title: Mr
First Name: Razvan Valentin
Last Name: Marinescu
Email address: razvan.marinescu.14@ucl.ac.uk
Institution: University College London
Department: Medical Physics
Street: 109 Camden Rd
City: London
ZIP code: NW1 9HZ
Country of residence: United Kingdom
Phone: +44787.184.8734
Nationality: Romanian
Gender: male
Date of birth: 22 July 1991

<b>2. Education</b>
Degree: postgraduate: 4-year CDT PhD in Medical Imaging at University College London undergraduate: Computing Meng (4-year) at Imperial College London
Title of diploma work: On a new metric to quantify local structure in biological and economic networks
Title of thesis: Differential Diagnosis of Alzheimer Subtypes Through Disease Progression Modelling
Current and future interests: Medical Imaging, Machine Learning, Bioinformatics, Computational Neuroscience, Complex Networks
Up to five techniques you are familiar with: <ul style="list-style-type: none"><li>• Machine learning (model fitting, maximum-likelihood)</li><li>• Hypothesis testing</li><li>• Computational neuroscience (artificial neuron models, criticality)</li></ul>

- |   |
|---|
| <ul style="list-style-type: none"><li>• Bayesian inference in graphical models</li><li>• Programming (MATLAB, Python, C/C++, Java, Haskell, Prolog, x86 Assembly)</li></ul> |
| Name and affiliation of the supervisor of your diploma: Dr. Natasa Przulj at Imperial College   |
| Name and affiliation of the supervisor of your thesis: Daniel Alexander, CMIC, UCL and Sebastian Crutch, Dementia Research Center, UCL                                      |

Please insert the following information into each section below:

**3. List of publications\***

Co-author on a paper submitted to IPMI.

**4. Curriculum vitae\***

see next page

## **5. Arguments for attending this school (motivation letter)\***

This school would help me better understand brain diseases by analysing imaging data (MRI/PET), genetic and protein data as well as neurophysiological test scores. I would have the opportunity to get hands-on experience with visualising high-dimensional data, clustering, prediction of disease onset and progression. All these techniques are highly relevant for my current MRes project that focuses on progression modelling of a rare variant of Alzheimer's disease called Posterior Cortical Atrophy. Since some of the biomarkers I use in my project come from brain imaging data or cognitive test scores, it would be very useful for me to get introduced to your imaging dataset and write an application for the identification of biological signatures of diseases.

I also like the fact that this school would be run like a hackaton, having several teams create of biological signatures of diseases using data from multi-modal biomarkers. These experiences can help us develop very important skills such as efficient team-work, planning, communication and presentation skills. As a computer scientist, I have in the past participated in similar hackatons and challenges and I always enjoyed it.

The HBP school would help me gain extra knowledge in the medical imaging, disease progression and data analysis areas which are highly relevant for my PhD project. I will have the opportunity to learn new things both from the lectures but also from other participants that are active in other disciplines. The HBP school would also allow me to get in touch with renowned experts from academia and industry that study brain disorders. These contacts could become close collaborators later on in my academic career.

## **6. Abstract for presentation at the workshop (title, authors, authors' affiliations, abstract; max. 3000 characters)\***

**Title:** Differential Diagnosis of Alzheimer Subtypes Through Disease Progression Modelling

I did my undergraduate studies in Computing at Imperial College London, where I graduated in 2014 with a First-Class Honours degree. My MEng thesis focused on the analysis of biological and world trade networks, where I developed a novel signature that could quantify the local topological structure around a node in the network graph. I correlated this topological information with various node annotations, such as protein function in Protein-protein Interaction networks or economic indicators such as crude oil price in trade networks. One of the findings of this project was that changes in the structure of the world trade network causes fluctuations in the crude oil price.

Currently, I am a first-year PhD student in the four-year Center for Doctoral

Training in Medical Imaging at University College London. My MRes project is on progression modelling of a rare variant of Alzheimer's disease called Posterior Cortical Atrophy. I will apply an event-based model (EBM) that was developed by HM Fonteijn et al, 2012, which models the progression of the disease as a series of events, where each event corresponds to a biomarker level becoming abnormal. The EBM can be used to calculate the most common event progression of PCA in the patient cohort or classify patients in various stages of the disease. I will also do longitudinal studies, trying to predict the probability of a patient converting from cognitively normal to mild cognitive impairment or from mild cognitive impairment to full PCA after a given follow-up interval. Lastly, for this project I will also test the differential diagnosis power of the event-based model in PCA. The fact that the EBM can provide patient-specific diagnostics, staging and predictions makes it widely applicable in clinical practice.

**7. Letter(s) of recommendation by senior scientist(s) who is (are) not PI(s) of student\***

see next page