Human Brain Project
Unifying our understanding of the human brain.

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

Please fill out this file and send it to: education@humanbrainproject.eu
Please note that we can only accept complete applications.
Mandatory fields are marked with a *.

1. Contact details
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

2. Education
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: • Machine learning (model fitting, maximum-likelihood) • Hypothesis testing • Computational neuroscience (artificial neuron models, criticality)

• Bayesian inference in graphical models • Programming (MATLAB, Python, C/C++, Java, Haskell, Prolog, x86 Assembly)
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***

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Razvan Valentin Marinescu

Education

2014 - 2018 | **4-Year CDT PhD in Medical Imaging, University College London**
MRes project: "Differential Diagnosis of Alzheimer Subtypes Through Disease Progression Modelling"
Modelling progression of a type of dementia called Posterior Cortical Atrophy using an event-based model, where each event represents an underlying biomarker becoming abnormal. The fact that the EBM can provide patient-specific diagnostics, staging and predictions makes it widely applicable in clinical practice.

2010 - 2014 | **4-Year MEng in Computing, Imperial College London**
First Class Honours
Master thesis: "On a new metric to compare internal structures in biological networks"
Supervisor: Dr. Natasa Przulj
Analysing biological networks (metabolic, protein-protein interaction) and researching a novel metric to compare nodes and sub-structures.

Hopfield Neural Networks: Successfully finished a research project describing experiments with recurrent neural networks, the Hopfield Model. My project was cited and acknowledged by Prof. Abbas Edalat at the **IJCNN 2013** conference in Dallas. Also presented the project in front of faculty members in Imperial College.

Emotional State Recognition: Explored, organised and presented novel research material that was focusing on algorithmically recognising the *affective state* of human subjects. I received a prize from Deutsche Bank for the best project in our research area.

Subjects studied include: Bioinformatics, Computational Neuroscience, Machine Learning and Neural Computation, Statistics, Programming, Simulations & Modelling, Complex Systems, Operating Systems, Robotics, Mathematical Methods.

Work Experience

Oct 2012 - Dec 2013 | **Teaching Assistant at Imperial College London**
Teaching Haskell, Java and C programming languages to university undergraduates.

Weekly marking of the student's coursework.

Conducted problem solving sessions, along with lecturing of important concepts.

Mar - Sep 2013 | **Industrial Placement at J.P. Morgan Chase & Co, Emerging Markets**
Assisted the retirement of a legacy system that was processing end-of-day market risk.

Learned to use company systems and program in the Python programming language.

Enhanced my transferable skills by leading team meetings and doing proof of concept demonstrations.

Jul - Sep 2012 | **Summer Internship at Goldman Sachs, Equities Technology**
Helping improve the Java source-code of a trading system through automatic re-factoring.

Learned a lot about various financial instruments, market data and how they are processed by computer systems.

Collaborated with the global team, analysed current issues about the software in use.

Jun - July 2011 | **Undergraduate Research Assistant at Imperial College London**
Developed Medical Software for that helps medics perform Endoscopy safer.

The algorithms use advanced statistical methods to analyse patient data and predict how easy an Endoscopy intervention would be performed on a new patient.

Awards

2013	DAAD Scholarship for doing a German Language course in Aachen, Germany over the summer.
2011	Prize for the best project (Recognising Affective State) in the Artificial Intelligence section, Imperial College London
2010	Sponsored visit to Brussels, at the **NATO Headquarters**, for the achievements in international projects and Olympiads.
2009	Grand Prize at the International Space Settlement Design Competition offered by **NASA Johnsons Space Center**.
2008	Diploma of Excellency awarded by the **Government** for impressive problem-solving skills.
2007	Bronze Medal ar the 6-th International Computer Project Competition "Informatix".
	Silver Medal at the National Mathematics Olympiad.

Skills and competences

Programming: C/C++, Java, x86 Assembly, Python, Perl, SQL, Haskell, Prolog, LaTeX

Computer Systems: Ubuntu, Windows, Version control systems(Git)

Languages: Romanian (native), German (fluent), French (basic), Spanish (basic)

Interests and Activities

- As a **Year Representative** in the Department of Computing, I developed leadership and speaking skills by putting forward the academic concerns of students in council meetings.
- **Treasurer** in the Romanian Society, managing the finances and organising various events such as bar and cinema nights, football games and food nights.
- **First Aider** in St John's Ambulance, offering first aid on various events such as the London Summer Ball, Wimbledon Championships and Arsenal games.
- Swimming, playing guitar and ice skating with friends in my free time.
- Wikipedia Editing: Wrote in several scientific articles, such as Gesture Recognition, Affective Computing and Hopfield Network.

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*

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UCL DEPARTMENT OF COMPUTER SCIENCE
CENTRE FOR MEDICAL IMAGE COMPUTING

Gary Hui Zhang, PhD
Lecturer in Medical Image Computing
Deputy Director, EPSRC Centre for Doctoral Training in Medical Imaging

6th February 2015

To Whom It May Concern:

I am writing this recommendation for Razvan Marinescu to attend the Human Brain Project workshop 15-18 March. I am a member of academic staff in the Computer Science department at UCL and work in the Centre for Medical Image Computing. I am also the Deputy Director of the EPSRC Centre for Doctoral Training (CDT) in Medical Imaging where Razvan is a first (MRes) year student with Professor Daniel Alexander.

Razvan is one of the top students that we recruited to our highly competitive CDT programme last September from over 300 applicants. He won one of only 10 fully funded four-year scholarships and was ranked among the top three of the 10 successful candidates for his outstanding academic record (First from Imperial College London) and strong motivation and enthusiasm for research. He has particular interest in computational modeling of disease progression, a topic highly relevant for this workshop.

Therefore I strongly believe that, if given the opportunity, Razvan will make important contributions to the workshop and benefit a great deal in their own research. Please don't hesitate to contact me if you require any further information.

Yours sincerely

Gary Hui Zhang

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