

Lucas Koelman, PhD

Computer scientist tackling complex data processing problems in healthcare and quantitative sectors. Research & development experience in industry and academia. Passionate about applying cutting-edge computational methods and modern technology stacks.

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Algorithms & Numerical Methods

Specialized in data analysis & visualization, signal processing, medical image analysis. Good knowledge of machine learning methods (neural networks, clustering, regression), numerical simulations, computational geometry.

Programming Languages & Frameworks

// **Scientific:** Python, MATLAB, Julia // **Data science:** Numpy, Jupyter, pandas, PyTorch, TensorFlow.

// **JVM and .NET:** Java, Kotlin, C#, C++. // **Cloud:** Linux, bash, Amazon AWS // **DB:** SQL, NoSQL, Spark

Software Engineering

Version control (git, svn), test-driven development, agile development, Linux system administration and cloud-based server management (basics), Extract transform & Load (ETL), standard operating procedure development.

Professional EXPERIENCE

Data Scientist, JK Invest

Leuven, BE (March 2020 – present)

Freelance data scientist (part-time) for financial risk management start-up.

- Design machine learning methods for financial forecasting and portfolio optimization.
- Implement predictive models in Python using Scikit-learn and Keras.

PhD Candidate, Neuromuscular Systems Group, Department of Electrical Engineering, University College Dublin

Dublin, IE (September 2015 – January 2020)

Project: Computational modeling of brain networks & activity underlying Parkinsonian motor symptoms. Modeling of electrical brain stimulation.

- Developed first large-scale, biophysical model of brain networks involved in Parkinson's disease, using biological neural networks.
- Implemented computational models on high-performance computing cluster in Python, Linux and MPI environment.
- Performed data analysis and visualization in Python using Matplotlib, Pandas, Scipy, and Jupyter stack.

Software engineer, Mobelife (Materialise Group), Process engineering and R&D

Leuven, BE (April 2014 – July 2015)

Development of software for parametric design of patient-specific hip implants.

- Overhauled pipeline & algorithms for 3D design of patient-specific hip implants for additive manufacturing. Resulting in significant reduction in costs, time to patient, and increased flexibility to surgeon feedback.
- Worked with doctoral and post-doctoral researchers to integrate new algorithmic developments in implant design process. Transformed research ideas to production-quality code.
- Designed and implemented medically validated software subject to strict regulatory requirements. Implemented computational geometry algorithms in Python/C++, integrated with GUI using C#.

Research exchange (MSc), Tsinghua University, Department of Biomedical Engineering, Center for Biomedical Imaging Research

Beijing, China (September 2012 – February 2013)

Research collaboration for master thesis "Exploration of novel neuroimaging contrast based on functional MRI and diffusion tractography data".

- Developed and implemented algorithms for multimodal data fusion (functional MRI and diffusion tractography data) in C++

EDUCATION

PhD in Neural Engineering, University College Dublin,
Ireland (2015 - 2020). Supervisor: Prof Madeleine Lowery

MSc in Biomedical Engineering, KU Leuven,
Belgium (2011 – 2014)

BSc in Electrical Engineering & Computer Science, KU Leuven,
Belgium (2008 – 2011)

Publications

- **Koelman, L.A.** and Lowery, M.M. (2019). *Beta-band resonance and intrinsic oscillations in a biophysically detailed model of the subthalamic nucleus-globus pallidus network*. Frontiers in computational neuroscience, 13, p.77
- **Koelman, L.A.** and Lowery, M.M. (2020). *Network effects of high-frequency and phase-locked DBS in a biophysically detailed model of the STN-GPe loop*. In Preparation.

OTHER SKILLS

- **Languages:** English – full working proficiency, Dutch – native, German – good, French – good, Mandarin – elementary
- Driving licence