Accenture – Digital Twins, Digital Patients and Virtual Cohorts for Insilico Trials

TIN-ACC-023

About the Organisation
Accenture Bioinnovation Technology Innovation Group (TIG) are a dedicated arm of research and development. We are focused on solving critical research questions & problems with advanced technology, by bringing fresh insights and innovations to our clients, helping them capitalize on dramatic changes in technology, business and society. Our dedicated team of technologists and researchers work with leaders across the company to invest in, incubate and deliver breakthrough ideas and solutions that help our clients create new sources of business advantage. At Accenture Bioinnovation TIG Dublin, based at The Dock, we focus on Artificial Intelligence technologies and systems like explainable AI, knowledge discovery and computational creativity applied to business areas as diverse as healthcare, life science, beauty, food and agriculture and consumer products.

Role Description and Responsibilities

Analysis Methods: Deep learning, Machine learning, Large Language Models

Data source Publicly available data sets. Internal private data sets.

Expected outcomes: The research intern will work with AI researchers to select and develop models with an application for drug discovery. Expected deliverable: prototype and a publication submission to a major academic conference.

Broader objectives: To develop computational methods for creation of a patient’s digital twin or virtual patient cohorts to be utilized in in-silico trials.

Internship Description
A Digital Twin is a highly complex virtual model, which is the exact replica of its physical counterpart. Digital twins in medicine can improve the design, development, testing and monitoring of new drugs and medical devices. Digital twins copies to predict the individual risk-benefit profile of a particular treatment given to a patient. Predictions could inform clinical trials design, enabling an effective validation of individuals and sub-groups expected to most benefit from specific drug treatments. The usage of Digital Twins could therefore greatly increase the accuracy and cost-effectiveness of clinical development programs with a huge impact on both drug quality and costs.

A Digital Patient is a personalized Digital Twin of a patient: an integrated framework of
methods and technologies, updated with each measurement, scan or exam, that enables a holistic management of the patient. It integrates all relevant medical information, and takes into account psychological, behavioural and genetic data as well. It combines scientifically proven knowledge with biophysical modelling and information obtained by processing and combining data, leveraging the power of AI and data analysis. In clinical care, the Digital Patient could be used to better predict disease course and treatment response. A virtual patient cohort is made of virtual members who all share a common model structure. This means that variability is encoded in the anatomy, physiological parameters and boundary condition parameters, as opposed to differences in model structure.

Despite the advancements made by deep learning methods in drug discovery, several challenges remain. One of these challenges involves lack of knowledge to interrogate heterogeneous responses to drugs, due to individual’s diverse genetic makeup and underlying biology. The use of virtual cohorts can help identify individuals who are likely, or not likely, to respond to the therapy, for example by identifying sub-populations within the intended patient population for which the proposed therapy is not likely to be effective.

The research intern will join a team working on deep learning for drug discovery. They will be in charge of designing, implementing, and evaluating novel principled ways to tackle one or more research problems listed above, with the ultimate goal of discovering methods to define a digital twin or virtual cohort. The intern is expected to explore and experiment with a range of techniques from prior art, propose original research, and implement ideas that will be validated with the research team in Accenture Labs Dublin.

**Supervision and Mentorship**

On-site supervision by Qurrat Ul Ain and other members of the research team in Accenture Labs Dublin will be provided.

**Person Specification**

**Key Requirements**

- Strong academic background in machine learning/deep learning methodology, generative neural networks, generative adversarial networks, autoencoders.
- Strong proficiency in at least one programming language, ideally Python, and relevant toolboxes: Scikit-Learn, Pytorch, Keras.
- Strong proficiency in working with software version control, e.g., Git.
- Interest in solving real-world scientific problems and in acquiring commercial awareness
- Demonstrable experience of performing well both when working as part of a team and individually
- Ability to pause your PhD for the duration of the internship and return subsequently.

**Internship Logistics**

This internship will be based in Accenture, Dublin - The Dock, 7 Hanover Quay. Please note that it is **not** possible for this internship to be performed remotely and it requires relocation to Dublin, Ireland.
Turing Internship Network – Fall 2023

Start date: Expected to be in February 2024, although this date is negotiable.
Duration: 6 months.
Remuneration: It will be pro-rated, based on an equivalent annual salary of €40k.

This is a full-time position, and we regret that we are unable to consider part-time applications.

When applying for this role, please include your resume. Your resume should show any relevant links to illustrate programming experience (e.g. GitHub handle) and scientific accomplishments (e.g. Google Scholar, dblp, arXiv links, personal homepage) if not already captured in the application form.