**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

& ECIT Global Research Institute

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| **Proposed Project Title: New machine learning approaches to heterogeneous big data analytics in precision medicine** |
| **Principal Supervisor:** DrAnna Jurek-Loughrey **Second Supervisor:** Dr Darragh McArt |
| **Project Description:** In today’s world a large amount of data is generated and collected in distinctive domains (e.g. health care, finance, social media etc). Big data analytics examines this data to uncover hidden patterns, correlations and other insights. The challenge in modern big data analysis is driven from the large scale and mixed types of data (text, graphs, images, numeric vectors etc). Precision medicine paradigms represent a new challenge in learning from data as the complexity of the machinery being deployed has risen and costs have reduced. It has the capacity to generate variable data types where markers may mean that patients undergo differential treatment strategies. Next generation sequencing platforms alone can generate data from count vectors for gene expression profiles to binary mutational calls on aberrant DNA. Many existing algorithms cannot be directly applied with this type of data because of their heterogeneity.This PhD project aims to develop scalable algorithms that can be used with biological data of multiple types in different environments. This will involve undertaking research in the areas of artificial intelligence and machine learning, information retrieval and bioinformatics.**Objectives:**The main focus of the project will be to develop novel machine learning methods with the following specific objectives:* Develop computational tools for integrating heterogeneous data
* Develop machine learning algorithms that address scale and heterogeneity of big data
* Evaluate the proposed algorithms with complex biological data
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