



SFI RESEARCH CENTRE FOR DATA ANALYTICS



**Insight Centre for Data Analytics
PhD position, Auditing imbalance and bias in deep
neural networks for multimedia content analytics
Up to 4 years in duration**

Background

The Insight Centre for Data Analytics (<http://www.insight-centre.org>) is an SFI funded Research Centre which brings together researchers from University College Dublin, NUI Galway, University College Cork, and Dublin City University, as well as other partner institutions, Trinity College Dublin (TCD), University of Limerick (UL), National University of Ireland, Maynooth (MU) and Tyndall National Institute. It creates a critical mass of more than 400 researchers from Ireland's leading ICT clusters to carry out research on a new generation of data analytics technologies in a number of key application domain areas, such as Health and Human Performance, Smart Communities, Internet of Things, Enterprise and Services and Sustainability and Operations.

The €150m Centre is funded by Science Foundation Ireland and a wide range of industry and European Union partners. Insight's research focus encompasses a broad range of data analytics technologies from machine learning, decision analytics and social network analysis to linked data, recommender systems and the sensor web. Together, with more than 220 partner companies, Insight researchers are solving critical challenges in the areas of Connected Health and the Discovery Economy.

Area of research: Computing, Media Analytics, Ethics, Artificial Intelligence

Auditing imbalance and bias in deep neural networks for multimedia content analytics

This PhD, jointly supervised by Dr Suzanne Little (DCU) and Dr Susan Leavy (UCD), will develop and evaluate algorithms that display socially unexceptionable bias in their analysis of multimedia content and propose new methods for detecting or interpreting such bias. Deep learning has enabled enormous advancements in multimedia analytics including computer vision tasks such as object detection and classification and action recognition. A challenge with deep learning models is the volume of data and computational power needed to build the most effective implementations and the resulting complexity and lack of transparency. Where pre-trained models (YOLO, ImageNet, etc.) are applied for transfer learning, the influence of the composition of the original training dataset is even more difficult to determine. There are efforts to assess datasets to ensure balanced and fair representations of gender, race, nationality, age, etc. but there remains significant work to be done to better understand the impact of training data composition on the bias and fairness of machine learning and artificial intelligence tools. Furthermore, options are needed to audit the resulting models without knowledge of the training data.

Eligibility:

To register for a Postgraduate Research programme, a candidate must normally have obtained a primary degree classification equivalent to Lower Second Class Honours or above, from an approved University or an approved equivalent degree-awarding body, or have an approved equivalent professional qualification in an area cognate to the proposed research topic. See <http://www.dcu.ie/registry/postgraduate/faq.shtml#q3>

English language requirements for non-native speakers of English is available here: <https://www.dcu.ie/registry/english.shtml>

Essential Skills:

- Undergraduate or Masters degree in computing, electronic engineering, mathematics or similar.
- Computer programming experience (Python preferred).

Desirable skills:

- Implementation of a project using machine learning, artificial intelligence, computer vision or similar technologies and evaluating the performance of the tool.
- Experience with some of the following libraries would be advantageous: Deep Learning framework (e.g., Keras, PyTorch, etc.), Scikit-learn, Pandas, OpenCV.
- Strong writing and communication skills.

The successful candidate will be expected to participate in Graduate Training:

Advanced training, in the form of accredited modules, known as 'Graduate Training Elements' or GTEs, are an important aspect of DCU's graduate research experience. Information on graduate training at DCU is available here: <https://www.dcu.ie/graduatestudies/training.shtml>

The successful student will be expected to undertake and pass a minimum of 20 credits of taught modules for the duration of their studies.

Mandatory Training

The successful candidate will be required to undertake the following mandatory training:

- Orientation
- Health & Safety
- Data Protection (GDPR)
- Other training may need to be undertaken when required

Stipend:

This is a 4 year fully funded structured PhD position with a stipend of €18,500 per year (tax-free, tuition fees paid).

Application Process

All expressions of interest, to include

1. CV including relevant publications and contact details of 2 referees
2. 1 page cover letter detailing relevant experience and interest in this specific position (please check the list of essential and desirable skills in preparing this letter)
3. Include or provide a link to a paper or article principally written by the applicant (eg, a publication or a project report)

in PDF only, are to be submitted by email to **Dr Suzanne Little, School of Computing, DCU**
suzanne.little@dcu.ie

**Please clearly state the role that you are applying for in your application and email subject line:
PhD position, Bias in Media Analytics**

Application End Date: 30/06/2020 Interviews will be carried out as soon as suitable candidates are identified.

Start Date: The position commences in September 2020 or when a suitably qualified candidate becomes available.

W: insight-centre.org