Data Science/ Data Mining

Your Name: Dr George Leontidis

Link to your staff profile page: http://staff.lincoln.ac.uk/gleontidis

Any other relevant links to your research: http://mlearn.lincoln.ac.uk

Complete this form for each project that you propose:

Project Name
Data analytics for sentiment analysis
Project Description:
Sentiment analysis is the process of using text analytics, natural language processing and computational linguistics to mine various sources of unstructured or structured data for opinions and knowledge extraction. Typically, sentiment analysis is done on the data that is collected from the Internet and/or various social media platforms. With the advent of social media, data is captured from different sources, such as web browsers and video files, and it is stored in various data formats. Because most of this data is unstructured with respect to traditional storage systems (such as Relational Database Management System), we need tools that can process and analyse this disparate data. Big data techniques have been developed to handle the different sources and different formats of the structured and unstructured data. This project aims to utilise apache spark and HDFS to conduct some analytics and identify trends or important topics in the news, putting them also into context.
Are there any prerequisite skills / courses?
Data Science/Data Mining
Which degree program is this aimed at? (It can be more than 1)
Any
Number of students you wish to undertake this project
No limit

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Project Name
Yield prediction in agricultural data
Project Description:
Greenhouses are complex entities, which include energy systems, monitoring of the climate via computer systems, etc., all aiming to optimise yield and production. This project aims to utilise various collected data which correspond to a specific vegetable or plant, so that a system can be developed to accurately predict yield and the number of items (e.g. tomatoes, cucumbers, etc.) or alternatively the growth of the plant. This is paramount in the life of a Greenhouse since to supply the product into the market, an estimate of the future production is needed for the large retail supermarkets to anticipate how many fruits/vegetables will be made available to them, and hence meet the market demands.
Are there any prerequisite skills / courses?
Ideally Data Science/Data Mining
Which degree program is this aimed at? (It can be more than 1)
Any
Number of students you wish to undertake this project
No limit

Your Name: DEA's Dicky Patounas + SoCS CS

Link to your staff profile page: www.dea.aero

Any other relevant links to your research:

Complete this form for each project that you propose:

Project Name
Possible work placement with DEA Aviation Ltd and/or follow-on project related to airborne ISR and airborne remote sensing.

Project Description:
Design software to improve data transfer rates of video and image files via a beyond line of sight satellite link. Design software via raspberry pi (or similar) pc's to filter sensor inputs prior to mission software input.   DEA Aviation Ltd operates maritime patrol aircraft fitted with a variety of systems. These systems are: Electro-optical and infra-red cameras Maritime radars Automatic Identification System (AIS) receivers Beyond Line of Sight Satellite links   The AIS receiver displays the location of all of the transmitting ships, onto the mission software. These locations are continuously updated. When operating in busy shipping channels, the end result is more information being fed into the mission computer, which can lead to a system crash. We aim to place a 'smart filter' (raspberry pi or equivalent) between the AIS receiver and the mission computer to reduce the number of non-critical inputs. The crew on board the aircraft are only able to view the ships that are closest to the aircraft. Therefore the details of these ships need to be up-to-date and accurate. As an example, the vessels that are over 20nm (nautical miles) away from the aircraft do not need to be updated very regularly as the aircraft will not be able to see or be overhead these vessels for at least 10 mins. Therefore the positions of the vessels beyond 20nm of the aircraft need only be updated every 7 mins. A sliding scale of filtering is required. Vessels inside 5.9nm from the aircraft – no filtering Vessels that are 6nm-9.9nm from the aircraft – 1 minute filtering

Vessels that are 10nm-14.9nm from the aircraft – 3 minute filtering

Vessels that are 15nm-19.9nm from the aircraft – 5 minute filtering

Vessels that are 20nm or more from the aircraft – 7 minute filtering

The project aims to devise a mini pc that will connect between the AIS receiver and the aircraft mission computer to filter the inputs and so improve the stability of the mission software whilst not negatively affecting operational delivery.

A likely extension would be to add a predictive component for buffering information based on the route of the aircraft v. ships within range and/or soon to be in sight.

Are there any prerequisite skills / courses?
CS: coding, data analysis, interfacing
Which degree program is this aimed at? (It can be more than 1)
BSc; MComp/Msc depending on implementation and further add-ons, MComp/MSc
Number of students you wish to undertake this project
1 (this project is linked to work from a placement)

Your Name: Shouyong Jiang

Link to your staff profile page: https://staff.lincoln.ac.uk/sjiang

Any other relevant links to your research:

Complete this form for each project that you propose:

Project Name
Evolutionary computing for mixed-integer programming

Project Description:
Many real-life problems can be interpreted as optimization problems (e.g. cost function in machine learning/deep learning), and these problems normally have a combination of discrete and continuous variables which we call mixed integer variables. Mixed integer problems are difficult to solve by classic mathematic programming due to either nonconvexity or indifferentiality. Instead, evolutionary computing approaches inspired by intelligent behaviors of animals/particles in nature can provide a way to solve these types of problems. This project is to develop new evolutionary computing approaches to deal with mixed integer problems.

Are there any prerequisite skills / courses?
Familiar with Matlab/python/c++, and have a bit knowledge of optimisation

Which degree program is this aimed at? (It can be more than 1)
BSc Computer Science, MComp Computer Science

Number of students you wish to undertake this project
2

Project Name
Evolutionary computing for constrained multiobjective optimisation

Project Description:

Evolutionary algorithms/bio-inspired swarm intelligence have shown great promise for solving multiobjective optimization problems to reach a good trade-off between several conflicting objectives (eg. Min effort vs max output). However, such approaches are not well understood if facing constraints. This project is to develop advanced approaches to solve effectively multiobjective problems with constraints.

Are there any prerequisite skills / courses?
Familiar with Matlab/python/c++

Which degree program is this aimed at? (It can be more than 1)
BSc Computer Science, MComp Computer Science

Number of students you wish to undertake this project
1

Project Name
Computational toolbox for dynamic multiobjective optimisation

Project Description:
Many effective algorithms have been proposed so far to solve dynamic multiobjectivve optimisation problems. However, many of them are written in different languages of different standards. This project is to create a toolbox of either matlab or python to include as many popular algorithms as possible. Therefore, good programming skills are desirable.

Are there any prerequisite skills / courses?

Familiar with Matlab/python
Which degree program is this aimed at? (It can be more than 1)
BSc Computer Science, MComp Computer Science
Number of students you wish to undertake this project
1