

Image Processing

Your Name: Faraz Janan

Link to your staff profile page: <http://staff.lincoln.ac.uk/fjanan>

Any other relevant links to your research:

<http://www.assure-project.eu/partners/matakina-ltd/staff/faraz-janan-dr/>

Copy, paste & fill in the below box for each project that you propose:

Project Name
3D Modelling using Hololens
Project Description: (This can be as long and detailed as you wish, but about 3 or 4 sentences will probably get the point across)
The project will aim to develop a 3D projection model for imaging data. Hololens is state of the art technology, introduced by Microsoft recently, to create a 3D hologram of an object imaged from various angles. This project will implement such a hologram and then further try to segment regions of in the 3D projections from the data in the 2D images. This is a challenging project while offering a considerable demand in industry.
Are there any prerequisite skills / courses?
Image processing and machine learning skills would be an advantage.
Computer Programming
Which degree program is this aimed at? (It can be more than 1)
Computer science, game programming
For students of any bachelors/masters lever program in computer science.
Both bachelors and masters, however, for the masters level the final goals are set more precisely
Number of students you wish to undertake this project

Your Name: Faraz Janan

Link to your staff profile page: <http://staff.lincoln.ac.uk/fjanan>

Any other relevant links to your research:

<http://www.gen.cam.ac.uk/directory/carazo-salas-group-members>

Copy, paste & fill in the below box for each project that you propose:

Project Name
Segmentation and Classification of Stem Cells
Project Description: (This can be as long and detailed as you wish, but about 3 or 4 sentences will probably get the point across)
Stem cells are basic to nearly all developing technologies in Genetics and Pharmacology fields that tries to edit or modify genes in a hope to grow organizes (artificial organs) or to find cure for diseases such as cancer. It involves an image analysist to segment stem cells in a living compound, in our case under fluorescence microscopy, and accurately classify them in different life cycle channels.
Are there any prerequisite skills / courses?
Computer Programming, preferably Matlab
Which degree program is this aimed at? (It can be more than 1)
For students of any bachelors/masters lever program in computer science.
Number of students you wish to undertake this project
2

Your Name: Faraz Janan

Link to your staff profile page: <http://staff.lincoln.ac.uk/fjanan>

Any other relevant links to your research:

<http://www.assure-project.eu/partners/matakina-ltd/staff/faraz-janan-dr/>

Copy, paste & fill in the below box for each project that you propose:

Project Name
Texture Analysis for Breast Density Classification
Project Description: (This can be as long and detailed as you wish, but about 3 or 4 sentences will probably get the point across)
Texture is considered to be very important in assessing the risk of developing breast cancer, as a consequence of increased breast density. A texture based model would be developed to classify x-ray mammograms in to various BIRADS categories that are used for routine clinical assessment in screening programs in the UK.
Are there any prerequisite skills / courses?
Computer Programming, preferably Matlab
Which degree program is this aimed at? (It can be more than 1)
For students of any bachelors/masters level program in computer science.
Number of students you wish to undertake this project
2

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
Deep Neural Networks for Image Classification
Project Description:
<p>A deep neural network is an artificial neural network with multiple hidden layers of units between the input and output layers. DNNs can model complex non-linear relationships and provide very good results in object recognition and image classification. The extra layers enable composition of features from the lower layers, enabling us to model complex data.</p> <p>This project aims to build and test deep neural architectures to effectively classify images into various categories, according to their content. Application areas vary such as images of food packages, images of dogs to classify actions, MRI scans to classify disease/no-disease, etc</p>
Are there any prerequisite skills / courses?
No
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: 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
Optic Disc Localisation in Retinal Fundus Images
Project Description:
<p>Human retina is an important, non-invasive window for monitoring the blood vessels, and is part of the brain's vascular system. A number of retinal, cardiovascular and systemic diseases can be identified by studying the retinal vasculature and the morphological changes.</p> <p>A challenging task is to localise and measure the diameter of the optic disc, which is found in every fundus image and has been associated with diseases, such as glaucoma.</p> <p>This project aims to build and test image processing and/or machine learning techniques in order to localise and/or measure the diameter of the optic disc and possibly identify any irregularities.</p>
Are there any prerequisite skills / courses?
No
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: James Brown

Link to your staff profile page: <https://staff.lincoln.ac.uk/jamesbrown>

Any other relevant links to your research:
<https://scholar.google.com/citations?user=bBXF4jgAAAAJ&hl=en>

Complete this form for each project that you propose:

Project Name
Classification of musculoskeletal phenotypes in x-ray images of mouse models
Project Description: Musculoskeletal disorders (MSDs) are the second leading cause of disability globally, comprising more than 200 different conditions of the bones, muscles and joints. Basic research into the genetic factors associated with MSDs is essential to the development of new drugs, which is made possible using x-ray imaging to study “knockout” animal models. For large scale projects, the annotation of such data is prohibitively time consuming. This project will involve the development of image classification techniques to automatically annotate bone abnormalities from x-ray images.
Are there any prerequisite skills / courses?
Programming in Matlab/C++/Python, some knowledge/experience in machine learning. CMP3108M Image Processing
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
3 - 4

Project Name
Intracranial hemorrhage classification from computed tomography data

Project Description:
Intracranial hemorrhages are bleeds inside the skull that require a timely diagnosis and intervention to prevent serious complications such as stroke. When a patient presents with relevant neurological symptoms, a computed tomography (CT) scan is typically performed so that doctors can identify the presence, location and type of hemorrhage. This process is both difficult and time consuming, and could be improved through the use of automated techniques. This project will involve the development of image classification techniques to automatically diagnosis intracerebral hemorrhage from CT scans.
Are there any prerequisite skills / courses?
Programming in Matlab/C++/Python, some knowledge/experience in machine learning. Passed CMP3108M Image Processing
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 - 3

Project Name
Optimization of pre-training schemes for medical image analysis
Project Description:
Nowadays, deep learning is the “weapon of choice” for solving problems in medical image analysis. A key limitation of deep learning however is the need for large annotated datasets to minimize overfitting and maximize generalizability. While many researchers use external datasets such as ImageNet to “pre-train” their networks, there is no clear evidence that this significantly improves performance in medical contexts, as they tend to be biased towards irrelevant texture features. Furthermore, ImageNet pre-trained networks cannot

be readily applied to 3D and 4D images. This project will look to explore and propose pre-training methods that are better suited to medical images and offer improved performance/robustness over ImageNet.

Are there any prerequisite skills / courses?

Programming in Matlab/C++/Python, some knowledge/experience in machine learning. Passed CMP3108M Image Processing

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 - 3

Your Name: DEA's Dicky Patounas + SoCS mLearn/LoVE

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

Follow-on project from work placement with DEA Aviation Ltd 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 between airborne capture and ground station.

DEA Aviation Ltd (www.dea.aero) 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

DEA sends live full motion video over a low bandwidth beyond line of sight satellite link. The bandwidth available is only 384kbps.

The imagery is sent via an encoder which suppresses and controls the output quality of the video before it is transmitted via the satellite link. DEA would like to further compress the video data before it is sent via the satellite link, in order to improve the quality of the image that is received at the ground station.

The project aims to devise ways of compressing the image through a combination of smart masking and advanced compressing techniques (software + hardware) with the end result being the best possible video quality received at the ground station.

Are there any prerequisite skills / courses?

Machine Learning and Vision/Imaging or equivalent preferred. Familiarity with DEA's equipment and modus-operandi.

Which degree program is this aimed at? (It can be more than 1)

BSc, MComp/MSc

Number of students you wish to undertake this project

This project is intended as a follow-on of a current placement.

Your Name: Dr Miao Yu

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

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

Complete this form for each project that you propose:


Project Name
Computer vision based indoor human segmentation
Project Description:
<p>Human segmentation is a preliminary step for a wide range of applications, e.g., activity recognition, human machine interface, abnormal events detection, surveillance, etc. This project focus on evaluating different human segmentations algorithm in indoor scenarios, to determine which segmentation algorithm is the most effective one applied in the indoor environment.</p> <p>You will be expected to implement/compare different human segmentation algorithms, including: background subtraction algorithms and deep learning algorithms, based on video sequences of different indoor daily activities (walking, eating, watching television, etc.)</p>
Are there any prerequisite skills / courses?
Basic knowledge of Matlab or C++, Image processing, Computer Vision
Which degree program is this aimed at? (It can be more than 1)
B.Sc or MComp.
Number of students you wish to undertake this project
1-2

Your Name: Dr Miao Yu

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

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

Complete this form for each project that you propose:

Project Name
Computer vision based fall detection
Project Description:

<p>Fall is dangerous which could cause serious physiological damages, especially for the elderly people. Although there are some techniques for detecting falls, however they are mostly based on the wearable sensors.</p>
<p>This project focuses on developing a camera based non-intrusive fall detection system used in a home environment. Such a system can detect the falling event when it happens, without the needs for a person to wear any equipment. It could be potentially applied for healthcare of the elderly people living alone at home.</p>
<p>You will be expected to exploit computer vision techniques for detecting falls based on video recordings by a camera, with respect to the following main aspects: 1). Obtaining</p>

human silhouettes in the recorded videos by image processing 2). Extracting some features from the obtained silhouettes which could be applied for detecting falls
Are there any prerequisite skills / courses?
Basic knowledge of Matlab or C++, Image processing, Computer Vision
Which degree program is this aimed at? (It can be more than 1)
B.Sc or MComp.
Number of students you wish to undertake this project
1-2

Your Name: Wenting Duan

Link to your staff profile page:

Any other relevant links to your research:

Complete this form for each project that you propose:

Project Name
Estimation of proliferation indices from microscopic images for tumour progression analysis
Project Description:
Glioblastoma multiforme (GBM) is the most common and aggressive malignant type of primary brain tumour. This kind of tumour grows very quickly. Without treatment, 95% of patients die within 3 months of diagnosis and only a small subset survive longer. The project is about developing or using image processing/deep learning techniques to aid the clinicians to understand how fast a tumour is growing in order to make treatment decisions.
Are there any prerequisite skills / courses?
Matlab/C++/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
2

Project Name
Photometric analysis of primula seeds
Project Description:
<i>Primula</i> has about 500 species in traditional treatments, and more if certain related genera are included within its circumscription. Plant scientists often need to look at an image of their seed, analyse the characteristics and try to identify what species it might be. However, the process of image analysis is time consuming. The project is about developing a standard and automated image analysis approach to aid the plant experts to recognise the seed.
Are there any prerequisite skills / courses?
Matlab/C++/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
2

Project Name
animal detection and tracking from videos
Project Description:
The project aims to develop an algorithm for the detection and tracking of objects from video, e.g. fish or bird. This would help ecologists to estimate population of certain species, their appearance and disappearance at certain location, understand the effect of climate changes on certain species of animals.

Are there any prerequisite skills / courses?
Matlab/C++/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
2

Project Name
Biomedical image processing – detection and/or segmentation
Project Description:
The project aims to develop methods of detection and/or segmentation for biomedical images. There are several datasets captured with different imaging modalities for you to choose to work on, for example, CT lung or brain, MRI brain, and CXR chest.
Are there any prerequisite skills / courses?
Matlab/C++/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
3

Your Name: Xujiong Ye

Link to your staff profile page: <http://staff.lincoln.ac.uk/xye>

Any other relevant information:

My main research interests are in the area of (medical) image processing, machine learning and computer vision. I would like to supervise the projects related to this field, such as image segmentation, object detection, noise removal, shape analysis, or image reconstruction, etc.

Project Name
Computer Aided Detection of Polyp in Colonoscopy videos
Project Description:
<p>The aim of this project is to develop new approaches, in real time, for automated identification of bowel polyps and cancer through analysis of video recorded data at colonoscopy, by performing computer vision and machine learning technology on each frame. You are expected to implement some of the following tasks 1) develop a software tool to allow the user to manually outline the region of interest (polyp) in a frame of the video. 2) Feature calculation from patches. A number of features including shape, texture or temporal information will be considered for detecting polyp. 3) Classification between polyp regions or healthy tissues. 4) Investigate some state-of-the-art Convolutional Neural Networks (CNNs) (e.g. VGG16, GooleNet, ResNet and AlexNet) to patch images extracted from video colonoscopy frames to classify patch images into polyp and non-polyp images.</p>
Are there any prerequisite skills / courses?
Basic knowledge of Matlab or C++, Image processing, Computer Vision
Which degree program is this aimed at? (It can be more than 1)
BSc CS, MCOMP CS
Number of students you wish to undertake this project

Project Name:
Medical Image Segmentation
Project Description:
<p>Automatic segmentation of medical images is an essential component of a computer-aided diagnosis (CAD) system. The aim of this project is to develop an initial method using image processing and computer vision techniques for segmentation of anatomic structures or tumor boundaries, such as segmentation of brain tumor from different imaging channels, lung nodule from CT imaging, ultrasound image segmentation, or skin lesion segmentation, cell segmentation, etc.</p>
Are there any prerequisite skills / courses?
Basic knowledge of Matlab/C++, Image processing, Computer Vision
Which degree program is this aimed at? (It can be more than one)
BSc CS, MCOMP CS
Number of students you wish to undertake this project
2

Project Name
Medical Image Classification
Project Description:

The aim of this project is to use advanced machine learning techniques to classify tumor into different grades (i.e. low grade or high grade). You will be given a number of statistical and texture features calculated from the segmented tumor region from different imaging modalities. You will also be provided with ground truth data to train the classifier model.

Are there any prerequisite skills / courses?

Basic knowledge of Matlab/C++, machine learning, Image processing

Which degree program is this aimed at? (It can be more than one)

BSc CS, MCOMP CS

Number of students you wish to undertake this project

2