PhD studentship on data-driven algorithms for respiratory motion correction in PET/CT

Description:

A PhD studentship (3.5 year funding) sponsored by GE Healthcare is available in the [UCL Institute of Nuclear Medicine](#) (INM). The funding covers an annual stipend (£17,800) and tuition fees at the rate for UK and EEA nationals. Non-EEA students will need to find further funding to cover the additional fee payment at the overseas rate.

The successful candidate will join the UCL CDT in Medical Imaging cohort and benefit from the activities and events organised by the centre. For more information please visit: http://medicalimaging-cdt.ucl.ac.uk/.

PET/CT scanners combine Positron Emission Tomography with X-rays to provide functional and anatomic images of the patient. In current clinical practice in oncology, PET data are acquired for ~2min while a single (fast) CT is used for attenuation correction. Respiratory movement is usually ignored. This causes reduced resolution but also problems due to misalignment between the PET and CT data, leading to reduced certainty in lesion localisation and errors in quantification. Various solutions have been developed to take respiratory movement into account by using gating (e.g. via external monitoring or data-driven), potentially followed by image registration and averaging to reduce noise. However, if a single CT is used for attenuation correction, the misalignment problem still exists. The current recommended solution is to use CINE CT data together with CT gating at the expense of higher dose to the patient. These problems, and remaining workflow complexities, delay uptake of advanced motion management strategies in the clinic.

The aim of this project is to combine the latest techniques on data-driven gating, image registration, motion modelling and image reconstruction to enable a workflow that is transparent to the patient and technicians while obtaining PET/CT images corrected for respiratory motion and are automatically aligned between the two modalities.

UCL INM has access to a variety of PET/CT, PET/MR and SPECT/CT scanners. This project will be in collaboration with the UCL Centre for Medical Imaging Computing and will combine our expertise in image reconstruction, motion estimation and motion modelling. This project will run in close interaction with GE Healthcare, and is part of a wider collaboration between UCL and GE in improved quantification for PET/CT.

Requirements:

The candidate is expected to have at least an upper second class degree in physics, engineering or related area and a Masters degree or equivalent in a relevant subject area. A strong mathematics background is essential. Good working knowledge of C++ and/or Python or MATLAB is preferable. The candidate must be committed to deliver excellence in research, and will also be expected to provide regular, biannual reports on research progress and present at international conferences.

Further eligibility information can be found at
https://www.ucl.ac.uk/prospective-students/graduate/research/degrees/medical-physics-bioengineering-mphil-phd
Information for non-UK residential students:
http://www.ucl.ac.uk/beams/phd/funding/ods
http://www.ucl.ac.uk/prospective-students/international

To make an application please send a CV and contact details, including email addresses for two referees, to Dr Kris Thielemans at k.thielemans@ucl.ac.uk. Please include a covering letter indicating why you believe you are suitable for the studentship, your long-term research and professional goals, and any particular expertise you have that you feel may be applicable in this work.

Closing date: 31st of May 2018