Title (tentative): Machine learning strategies for lung cancer recognition

Thesis advisor(s): Storace Marco, Padraig Cantillon-Murphy (University College Cork, Ireland)

E-mail: Marco.Storace@unige.it

Address: Via Opera Pia 11A, secondo piano

Phone: (+39) 010 353 2079

Motivation and application domain
Lung cancer is the leading cause of cancer death globally and diagnosis is generally predicated by a suspicious chest CT, to be confirmed by physical biopsy, either endoscopic or surgical. Shape, density, multiplicity and possibly location of nodules in the lung may represent an increased probability of malignancy.

General objectives and main activities
This project will seek to use machine learning strategies to analyse lung CT images and correlate between the nodule's physical characteristics and clinical outcomes (e.g., cancer or not cancer). Physical characteristics of the lung nodule will be assessed building on ongoing work at the Biomedical Design research group at UCC using the Slicer 3D platform which, in the future, will segment and classify nodules to stratify risk of malignancy. This will then be verified clinically in collaboration with the UCC Department of Radiology. Students with experience in Matlab, Octave, Python or similar tools are most suitable and prior work in the area of machine learning is an advantage. While experience with medical images is an advantage, this is not a requirement. 3D CAD design, SolidWorks, AutoCAD or similar, 3D prototyping and printing experience is an advantage. Further questions can be directed to padraig@alum.mit.edu

Training Objectives (technical/analytical tools, experimental methodologies)
The student will complete a peer-reviewed publication documenting the methodologies and outcomes. The anticipated project duration is 6 months. Main technical tool: Matlab

Place(s) where the thesis work will be carried out: The Biomedical Design Research Group, University College Cork, Ireland

Pre-requisite abilities/skills: Significant Matlab experience, machine learning and medical image analysis background an advantage

Maximum number of students: 1