Smart Videocolonoscopy for Early Diagnosis of Colorectal Cancer

Invited-Professor Research Project, Dr Jorge Bernal, Universitat Autonoma de Barcelona

Context of the research project

Colorectal cancer (CRC) is the first cause of death by cancer in developed countries, with an estimated incidence of 728.550 cases worldwide in 2008, with fatal outcome in 43% of cases. Overall, CRC is the third more frequent cancer after lung cancer and breast cancer [1] (see figure 1 for comparisons with other type of cancer in 2012). Prevention of CRC by detection and removal of preneoplastic lesions (colorectal adenomas) is therefore of paramount importance and has become a worldwide public health priority.

Currently, colonoscopy is the "gold standard" technique for diagnosis of colorectal adenoma and cancer. Using a videoendoscope, gastroenterologists can perform and record a complete examination of the colon in order to detect and to remove suspicious tissular structures like adenomas (polyps) which degenerescence could lead to cancer. Despite the technological level reached by videoendoscopes, a recent study showed that this type of exams suffers from an important variability in terms of polyp detection rate due to several elements including experience of the clinician and time of the exam. In this context, Computer-Aided-Diagnosis (CAD) tools are of primary interest to improve and strengthen the performance of the exam.

In that context, in conjunction with next MICCAI conference (October, Munich), UAB (Dr Jorge Bernal) and ETIS laboratory (Prof. Aymeric Histace) will co-organize a challenge on automatic polyp detection in videocolonoscopy with objective to provide the most up-to-date state-of-the-art in this particular domain. This event is also the starting point of a scientific collaboration on a wider research project dedicated to "Smart Video-endoscopy" between the two institutes that have developed a strong experience in that domain for the last ten years.

Scientific program

Currently UAB has mainly developed techniques for automatic detection of polyps in colonoscopy. Complementary to this, ETIS lab has focused attention on the embedding of detection algorithms for real-time analysis of videocolonoscopy and image segmentation for the fine characterization of the detected structures.

The scientific program of the invitation is divided into two main sub-objectives:

- Finalization of the writing process of a journal article related to the MICCAI challenge results mentioned above.
- Joint-work on image segmentation for characterization of polyp structures in videocolonoscopy with objective to define the layout of a proposal that will be submitted to international/national calls in a close future.