

RESUMO N° 80

IMAGE-BASED LOCALIZATION OF WIRELESS CAPSULE ENDOSCOPE

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Wireless Capsule Endoscopy (WCE) is a swallowable device for examination of the Gastrointestinal (GI) tract. Due to the non-invasive nature of the technique, WCE has emerged as an excellent method for the diagnosis of GI diseases. Moreover, unlike traditional invasive endoscopies, which cannot reach the small intestine, WCE allows the examination of the whole GI tract. As the WCE travels through the GI tract, propelled by peristalsis, it acquires approximately 50.000 images of the inside of the GI wall. All the images are sent to a store device, placed outside the body, for further analysis by physicians. Despite the mentioned advantages, the lack of information regarding the WCE precise location in the human body remains a major limitation of WCE. In fact, when an abnormality is detected in the images, it is very difficult to localize the affected area. Therefore, without the accurate localization of the patient's pathology, the medical doctors cannot proceed immediately with the appropriate therapy. The most common techniques to overcome this problem rely on sensor networks attached to the body. A wide variety of sensors have been proposed, including radio frequency (RF) and magnetic sensors. The WCE position is estimated using the strength of the RF signal or magnetic field emitted by the capsule. Although some promising results were reported, the accuracy of this class of methods is still not sufficient. We propose a framework for WCE motion estimation from image registration techniques. In a first step, and since the intestine is an elastic organ, we track the deformation of the intestine walls, in consecutive frames, by using a multiscale elastic registration procedure. Then, in a second step, we estimate the displacement and rotation of the capsule using projective geometry. This procedure can also be used as a complement to sensor-based methods.