

On-line learning dynamic models for nerve detection in ultrasound videos. Oussama Hadjeri, Adel Hafiane, Pierre Vieyres, Donatello Conte, Pascal Makris, Alain Delbos

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The leading advantage of Ultrasound-Guided Regional Anesthesia (UGRA) is the ability to visualize the anatomical structure of interest. The nerve detection should translate into greater efficacy, by ensuring accurate deposition and spread of local anesthetic around the target nerve. The identification of nerve is among the most difficult tasks that anesthetists can encounter in the UGRA procedure. It is important to develop an automatic nerve detection algorithm to assist the UGRA practitioners. However, robust and automated nerve detection is challenging due to inherent noise and artifacts in ultrasound images and to the variability of the nerve structure. In order to deal with such a problem we propose a new method based on learning and estimating a dynamic on-line model of nerve position consistency and confidence measure by using general Gaussian. Based on that, Naive Bayesian measure is used to indicate whether a detected nerve region is reliable or not. Experiments were conducted on 7000 ultrasound images from 10 patients achieving an average f-score of 83%.

Index Terms— Dynamic model, feature extraction and selection, supervised learning, nerve detection, regional anesthesia.