Fully Automatic Anesthesiologists Trajectory Prediction Based on Graph Convolution Networks for Autonomous Clinical Decision Support System

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1   Abstract

In critical and complex life-and-death situations, such as during complex resuscitation procedure, anesthesiologists' decision-making is of utmost importance. Thus, clinical decision support systems (CDSS) have been deployed to assist the medical staff by enhancing clinical decisions. In a field where seconds can make the difference between life and death, integrating an autonomous CDSS framework capable of predicting medical treatment planning and assisting accordingly, can save lives. This requires the framework to accommodate a certain level of awareness and understanding which will not affect clinicians' work except in cases it is required. In addition, the system must withstand diagnostic ambiguity and chaotic environment. In this paper, we describe a technique for mining speech uttered during medical simulations to automatically create trajectories of resuscitation procedures, which leverage graph networks and language models. Furthermore, during complex resuscitation, we describe a technique for tracking the current state of the procedure and predicting the physician next action. This can be used to save time by prepping the required instrument in advance. This autonomous CDSS can be used to assist anesthesiologists during medical emergencies, and our simulations shows it can save 00:01:28±00:01:15 minutes in prepping adrenaline dosage, which is crucial for a successful resuscitation.