TUHH
Technische Universität Hamburg-Harburg

MTEC
Medical Technology | Intelligent Systems

Project work / BSc thesis / MSc thesis

Title: Machine learning based tracking of anatomical structures in intubation videos

Background: Airway management problems and airway-related adverse events are the main causes of anesthesia-related complications and liability for anesthesiologists. Reliable, personalized airway risk prediction is an essential prerequisite for safe anesthesia as it allows optimized individual anesthesia planning. One factor in estimating the risk of a specific patient scheduled for anesthesia is the size and location of certain anatomical landmarks which can be studied from previous intubations. For that purpose, videos of intubations have been recorded and anatomical landmarks (eg. Epiglottis, arytenoid cartilage) have been labelled by medical experts.

Tasks: The labelled intubation videos should be analyzed. Labels that have been assigned by hand should be learned. A system should be implemented that can automatically detect landmarks in new intubation videos and make a risk prediction based on the detected landmarks. Multiple state-of-the-art methods should be evaluated and compared for different modules of the system. Furthermore, usefulness of temporal information can be investigated to study if the detection accuracy of landmark improves.

Specific steps include:

1. Familiarize with the data
2. Research methods for machine learning based tracking
3. Implement machine learning pipeline for convolutional neural networks (CNNs)
4. Investigate usefulness of temporal information for improving detection accuracy
5. Evaluate and compare multiple machine learning approaches
6. Implement risk prediction based on estimated labels
7. Evaluate risk prediction

Requirements: Good programming skills in Python, ability to work independently, experience with machine learning

Not required is experience in medicine.

Difficulty: 🎈🎈🎈♡♡

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