**Using transfer learning for diagnosing LPR signs**

This project explores the application of machine learning and transfer learning for the automated diagnosis of laryngopharyngeal reflux (LPR) using laryngoscopy video analysis. LPR is a condition in which stomach acids or other irritants reflux into the laryngopharyngeal region, leading to symptoms such as hoarseness, throat clearing, and difficulty swallowing. The condition is often difficult to diagnose due to fact that its symptoms are non-specific for this condition as well as for limited time for their review and subjectivity of evaluation. We attempt to address these shortcomings by using neural networks, which recently became an important and widely applied tool for medical image analysis.

Due to the limited availability of LPR-specific video data, we employ transfer learning by pre-training three deep learning models: VGG-19, ResNet-101 and EfficientNet-B2 on ImageNet to establish a strong feature extraction foundation. The models are then fine-tuned using framed images extracted from laryngoscopy videos provided by medical professionals. To further improve model robustness and address data limitations, we apply data augmentation techniques to the extracted frames. The primary objective is to accurately diagnose LPR by detecting key indicators, including posterior commissure hypertrophy, erythema and ventricular obliteration. To assess model performance, we systematically evaluate and compare the three architectures, using diagnostic results from three independent doctors as a benchmark. By leveraging advanced deep learning techniques, this research aims to make a step in development of a reliable diagnostic tool that can support clinicians in early and precise LPR detection, ultimately improving patient outcomes.

Keywords:

Transfer Learning, Laryngopharyngeal Reflux , Laryngoscopy Video Analysis, Computer-Aided Diagnosis, Convolutional Neural Networks