In this work, we performed research and developed a complete holistic medical multimedia system for gastrointestinal (GI) tract disease detection and localization. The developed DeepEIR system is based on classical Computer Vision (CV) as well as modern Artificial Intelligence (AI) methods and designed as flexible, generalizable, adaptable, efficient and accurate. It supports various endoscopic devices including modern wireless capsular endoscopes as data sources. DeepEIR not only reaches high accuracy for lesion detection and localization, but also it is easily expandable with new diseases and objects. The system can both process a vast amount of data off-line and perform real-time support during live medical procedures. DeepEIR is being tested by medical experts for real clinical studies and trials. We expect that our system will have a significant impact on current medical practices in GI tract investigation procedures and will be useful for end-users playing an essential role for the successful improvement of health care systems addressing challenges and open problems in the field of medicine.

We also contributed to the problem of medical data availability for research community. We collected, annotated, and published several datasets and data annotation tools as open source. Our datasets (Kvasir, Nerthus and Medico) immediately got a lot of attention and they are used by many independent research teams. Using our data, we started and running already for three years a multimedia medical data analysis challenge.

All-in-all, this work connects Multimedia and Medicine and uses Image Analysis, Machine Learning (ML), Convolutional Neural Networks (CNN), Deep Learning (DL), Generative Adversarial Networks (GAN) and user-oriented interfaces design to support doctors in their daily routine, reduce lesion overlooking and, therefore, have a societal impact by helping people to survive lethal diseases.