Convolutional neural networks in the diagnosis of eye diseases – selected examples and applications

dr inż. Rafał Jóźwiak [1,2]
mgr inż. Łukasz Kiełbus [2], mgr inż. Łukasz Osowicki [2]

[1] National Information Processing Institute National Research Institute, Laboratory of Applied Artificial Intelligence
e-mail: Rafal.Jozwiak@opi.org.pl
[2] Faculty of Mathematics and Information Science, Warsaw University of Technology

- Explainable artificial intelligence (AI) is attracting much interest in medicine
- To realize explainable medicine we need to go beyond explainable AI – causability is needed
- We must distinguish between an explainable model ("explainable AI") and an explanation interface which makes the explanation useful to the expert
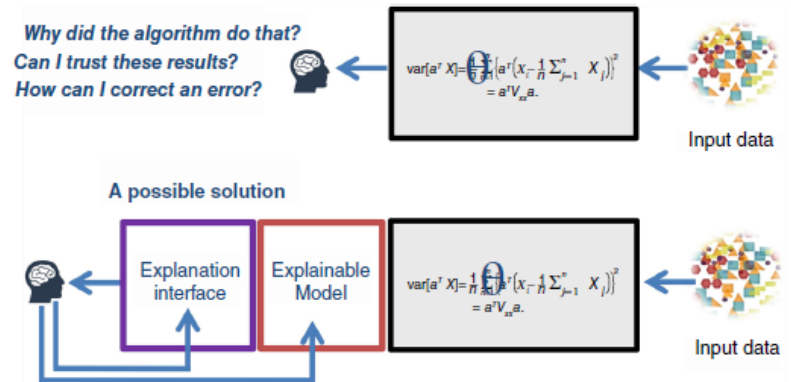
*Source: Holzinger, A., Langs, G., Denk, H., Zatloukal, K., & Müller, H. (2019). **Causability and explainability of artificial intelligence in medicine**. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery, 9(4), e1312.*
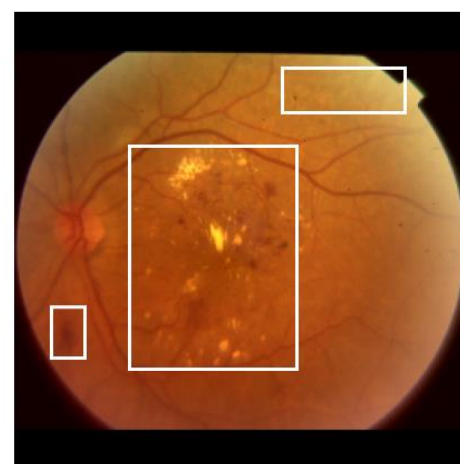
Eye diseases considered

Glaucoma

Pathological myopia

Age-related macular degeneration (AMD)

Diabetic retinopathy (DR)

Used explainability technique

Integrated Gradient (IG) visualizes its input feature importance that contributes to the model's prediction

Multi-label combined model (for several diseases)

model based on causal symptom-disease modeling

Explanation interface for proposed multi-label model
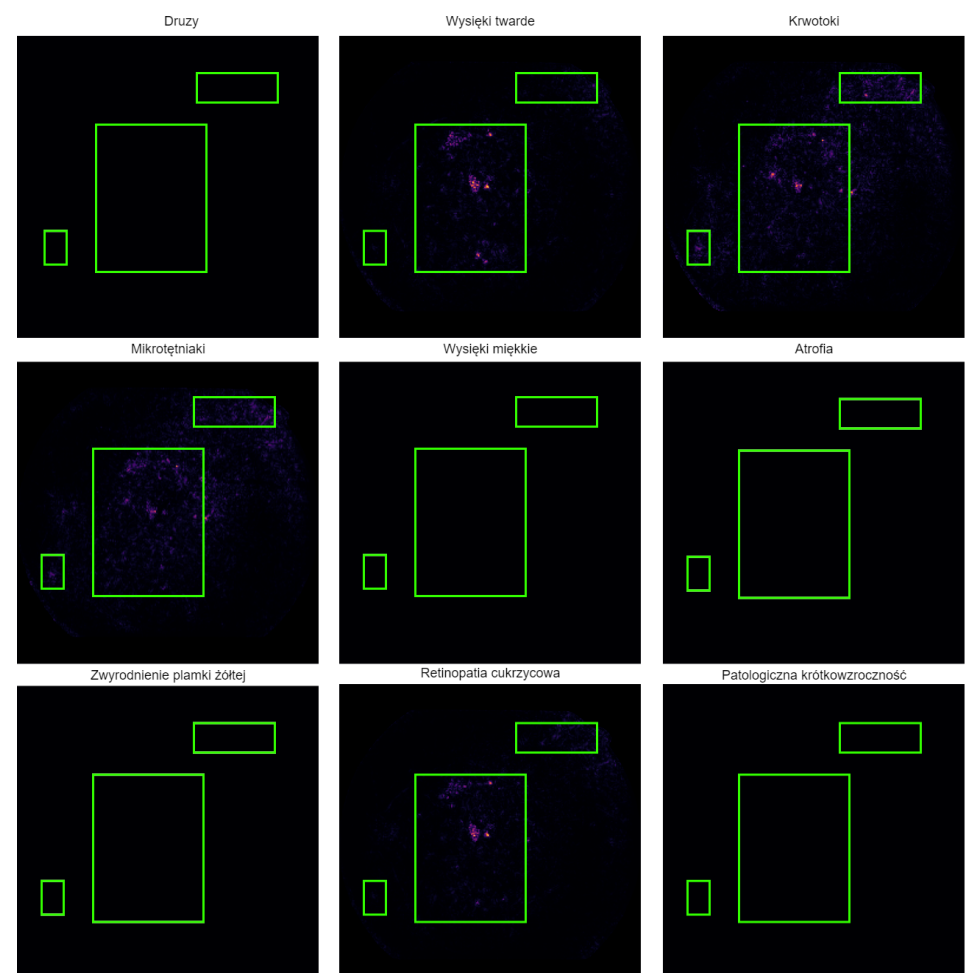
model predictions for individual symptoms and diseases
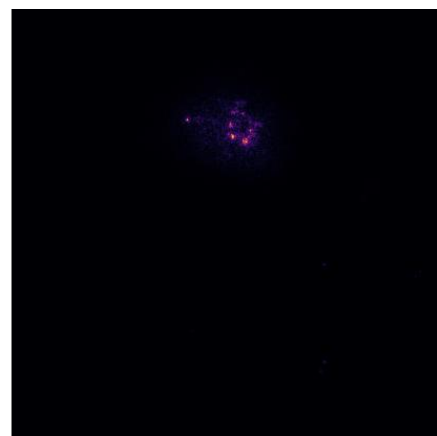
model explanations for individual symptoms and diseases