

Diagnostics Helper for Medical Images

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Motivation

Situation / Problem / Goal:

We build the machine to take pictures of a patient's retina and want to offer a new feature where we automatically detect retinopathy in these pictures and alert the doctor (e.g., highlight affected areas in the picture).



<https://ai.googleblog.com/2016/11/deep-learning-for-detection-of-diabetic.html> (29.11.2016)

Value Generation:

- ☐ internal process optimization
- ☒ improves existing product
- ☐ new product / Software-as-a-Service
- ☐ other:

Business KPI:

(balanced) accuracy of the model

Status Quo:

human accuracy without model (unknown)

Solution Outline

Deliverables:

- ☐ insights
- ☒ **software:** model that detects retinopathy in the images

☒ Build

☒ Buy

Inputs:

- ☐ (numeric) values: _____
- ☒ image
- ☐ text
- ☐ other: (e.g., audio, video)

1 Data Point: an image of a patient's retina

Workflow Integration:

get image from machine and display results on the screen together with the picture that was taken

ML Solution & Output:

- ☐ Dimensionality Reduction: **2D coordinates**
- ☐ Outlier Detection: **anomaly score**
- ☐ Clustering: **cluster index**
- ☐ Regression: **continuous value:** _____
- ☒ Classification: **discrete value (e.g., yes/no):** retinopathy yes/no
- ☐ Recommender Systems/Information Retrieval: **ranking of items**
- ☒ Deep Learning: **other:** mark hemorrhages in image

Additional Steps?

- ☒ Explain predictions (which image sections contributed to prediction)
- ☐ Use model in optimization (to find optimal inputs)

Challenges & Risks (+ Mitigation Strategies)

What might go wrong?

Probability:

Can you do anything about this?

predictions might be wrong

medium

carefully test the model; explainability crucial so doctor can validate the results

data contains noisy labels: doctors sometimes didn't agree on the diagnosis

medium

ask specialists to relabel cases with disagreement

images might change in the future

low

we control the hardware and make sure to track all changes

we don't have the necessary ML expertise in house to build a good enough model

high

collaborate with external consultants / university