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Register data in a clinical situation – meeting the patient

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Scenario 1

Explainable

Based on my experience and knowledge I´d say chances

are 70% that you´ll be much better

Dr, how much better will I be if I have the surgery?

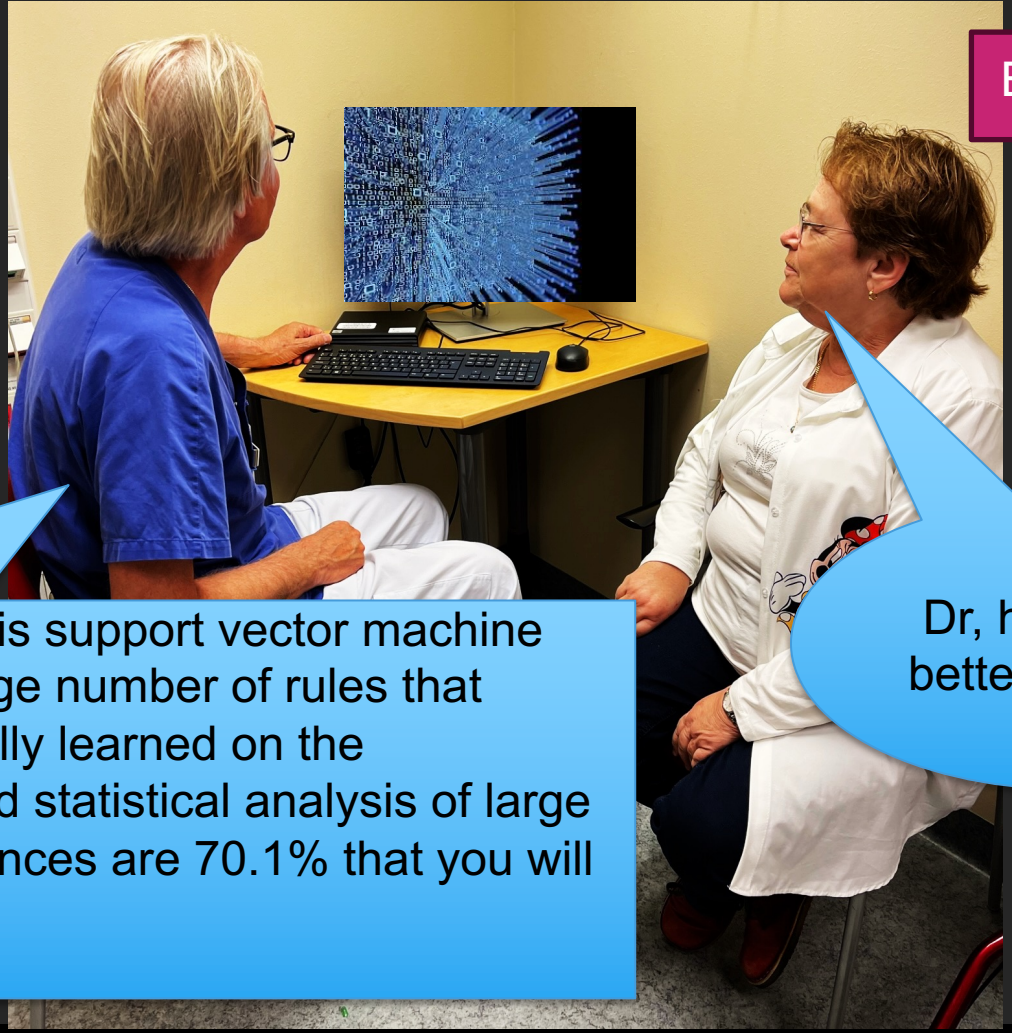
Scenario 2

Relatively easy to explain

Dr, how much better will I be?

According to this prediction model, based on the outcome of thousands of patients operated for spinal stenosis, chances are 70% that you will be much better

Scenario 3

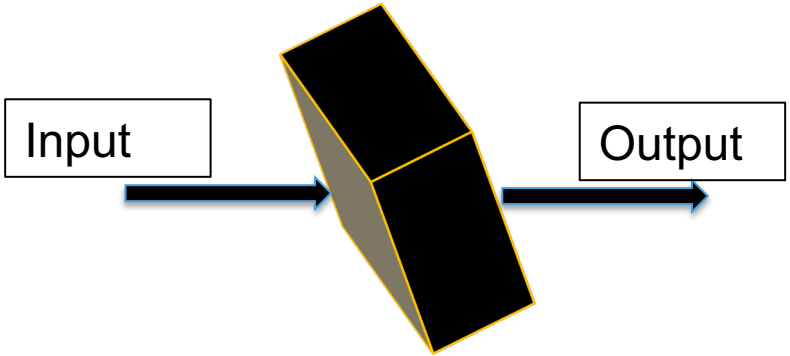


Explainable?

Hm, according to to this support vector machine model, based on a huge number of rules that have been automatically learned on the basis of correlative and statistical analysis of large quantities of data, chances are 70.1% that you will be much better…

Dr, how much better will I be?

The black box dilemma



Artificial intelligence and machine learning in spine resea

2018

Prediction Models in Degenerative Spine

2021

bal Spine Journal
. 11(1S) 79S-88S
Author(s) 2020
reuse guidelines:

Utility of machine learning algorithms in degenerative cervical and lumbar spine disease: a systematic review

2021

Review

Artificial Intelligence-Driven Prediction Modeling and Decision Making in Spine Surgery Using Hybrid Machine Learning Models

Babak Saravi [1,2,3,*], Frank Hassel [2], Sara Ülkümen [1,2], Alisia Zink [2], Veronika Shavlokhova [4], Sebastien Couillard-Despres [3,5], Martin Boeker [6], Peter Obid [1] and Gernot Michael Lang [1]

2022

Artificial Intelligence and Machine Learning Applications in Spine Surgery

Nathan J. Lee, Joseph M. Lombardi and Ronald A. Lehman

Int J Spine Surg published online 16 May 2023

2023

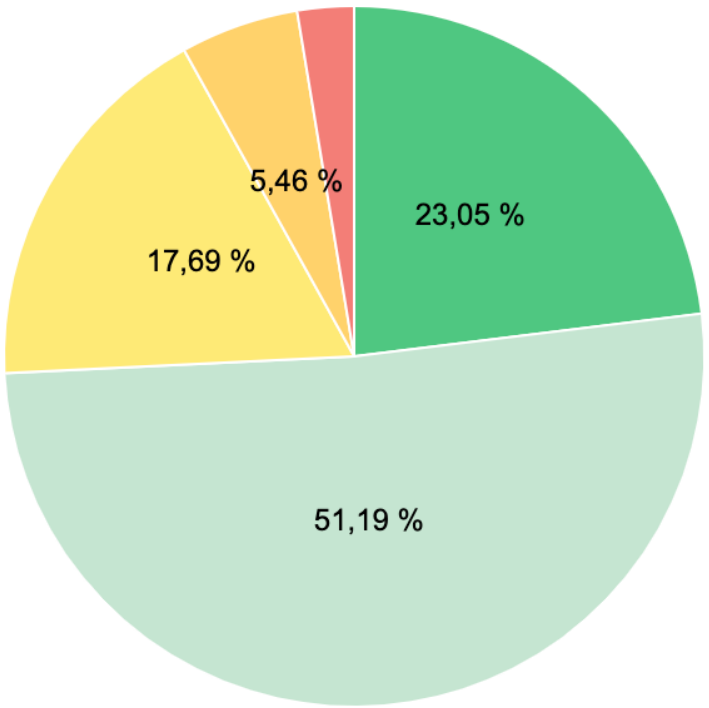
”ML has the potential to augment surgeon decision-making and improve surgical outcomes”

It has not been tested if prediction models (neither ”simple” regression nor machine learning models) augment surgeon decision-making and or improve surgical outcomes in real life
I.e., are they useful?

Does the use of a big data prediction model improve the outcome?

A clinical multicenter trial testing the Swespine Dialogue Support

”Dr, what are my chances of a good outcome if I have this surgery?”



Proportion with successful outcome

74 %

Pain completely resolved or greatly improved

Prediction models should be

- Clear
- Instructive
- Relevant
- Reassuring
- Comprehensible

Cabitza et al -23

Do the prediction models

- make the advice more understandable from a causal point of view?
- make the patient selection more accurate ?
- affect the way surgeons or patients trust a given advice?
- facilitate decision-making?
- give better advice than the surgeon does?

The measurement of Technology Dominance

What if the machine is wrong and the target users are misled?
(i.e., the quality of the prediction model is too low)

Automation

Automation: the allocation of functions to technology, that is justified in all those situations where it may improve performance

Automation bias: the type of human cognitive bias due to over-reliance on the recommendations of an AI-system

Araujo et al -20

From “Little Britain”, 2004


Carol
Do not put all your trust in the machines

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