Der digitale Arzt: Die Zukunft hat bereits begonnen

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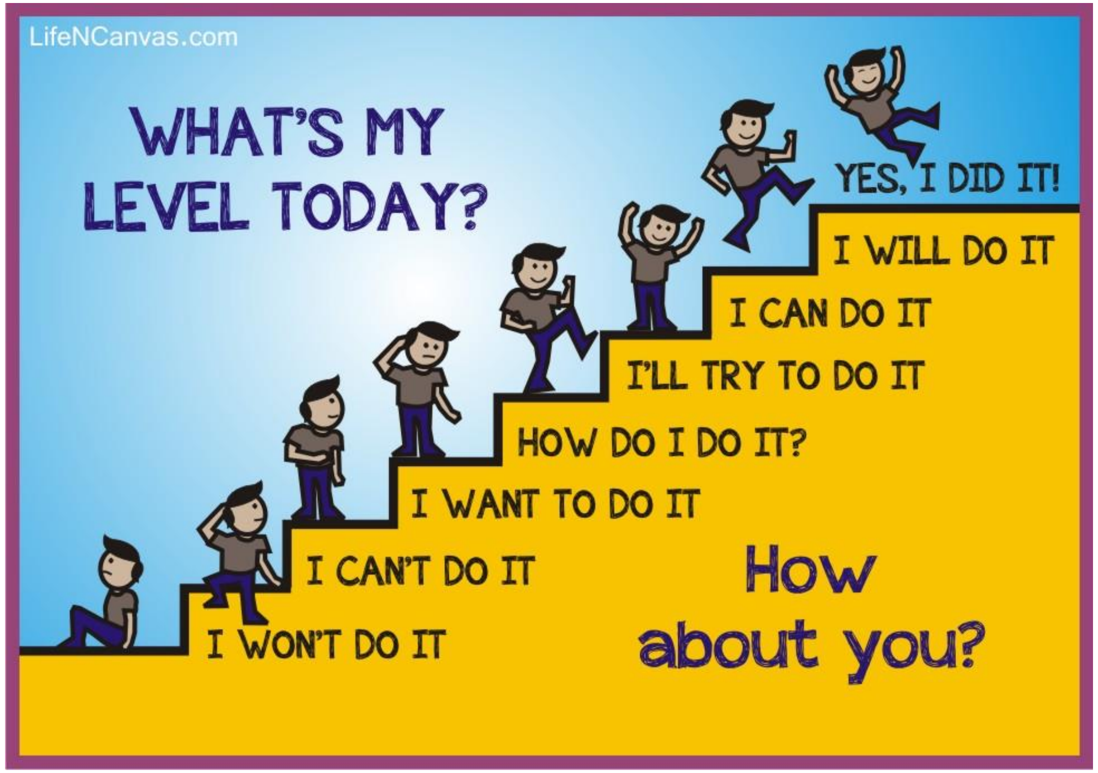
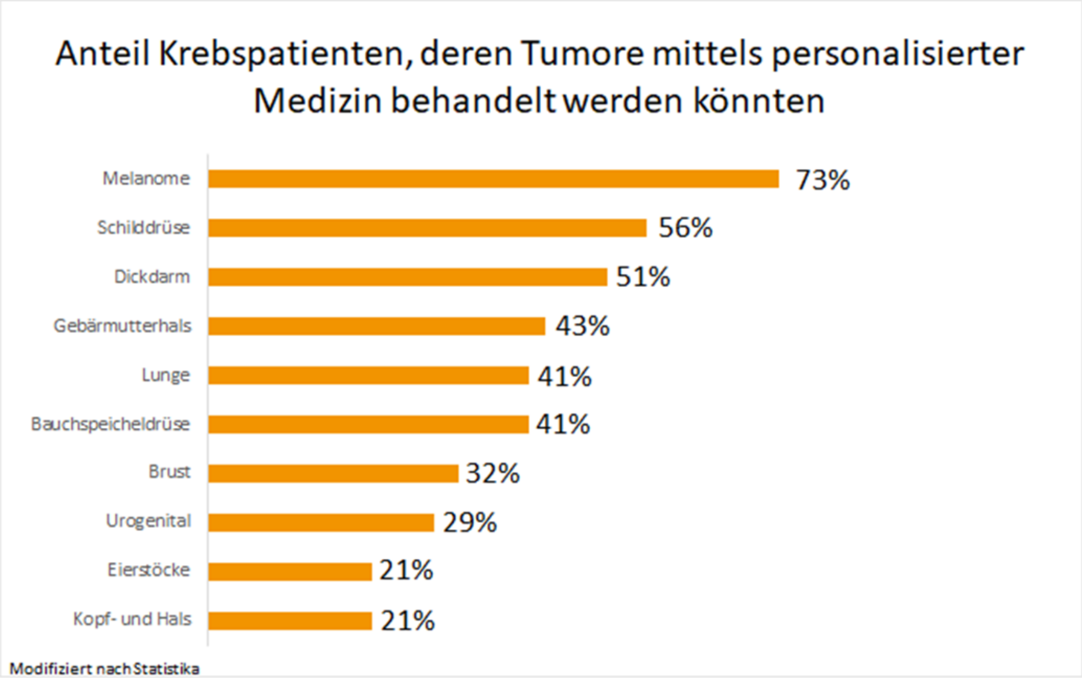
Best practice



Megatrends in der Medizin



Megatrend in der Welt

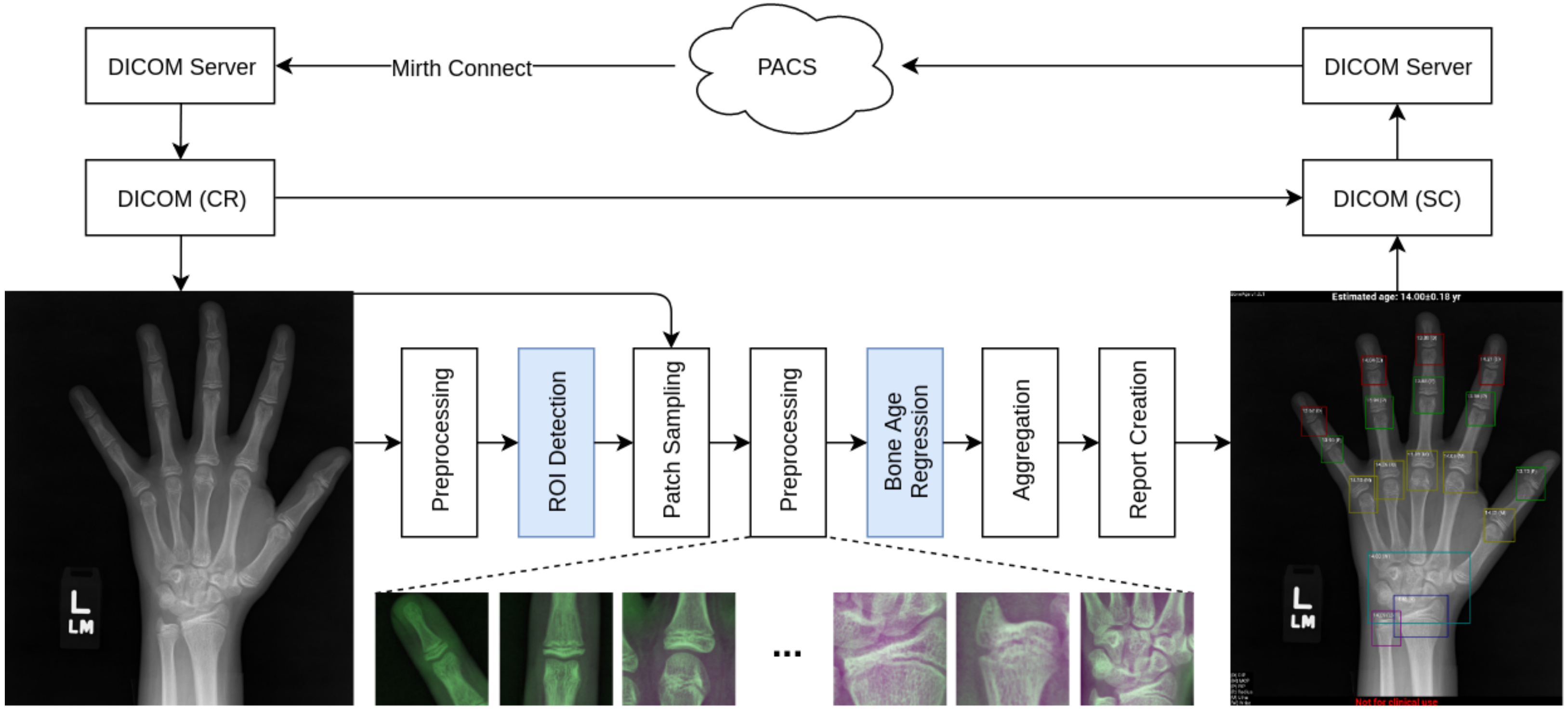
Wir müssen die Trends zusammen bringen!

1. Digitalisierung ist die Voraussetzung für die Anwendung von Künstlicher Intelligenz
2. Nur mit Künstlicher Intelligenz wird personalisierte Medizin möglich sein

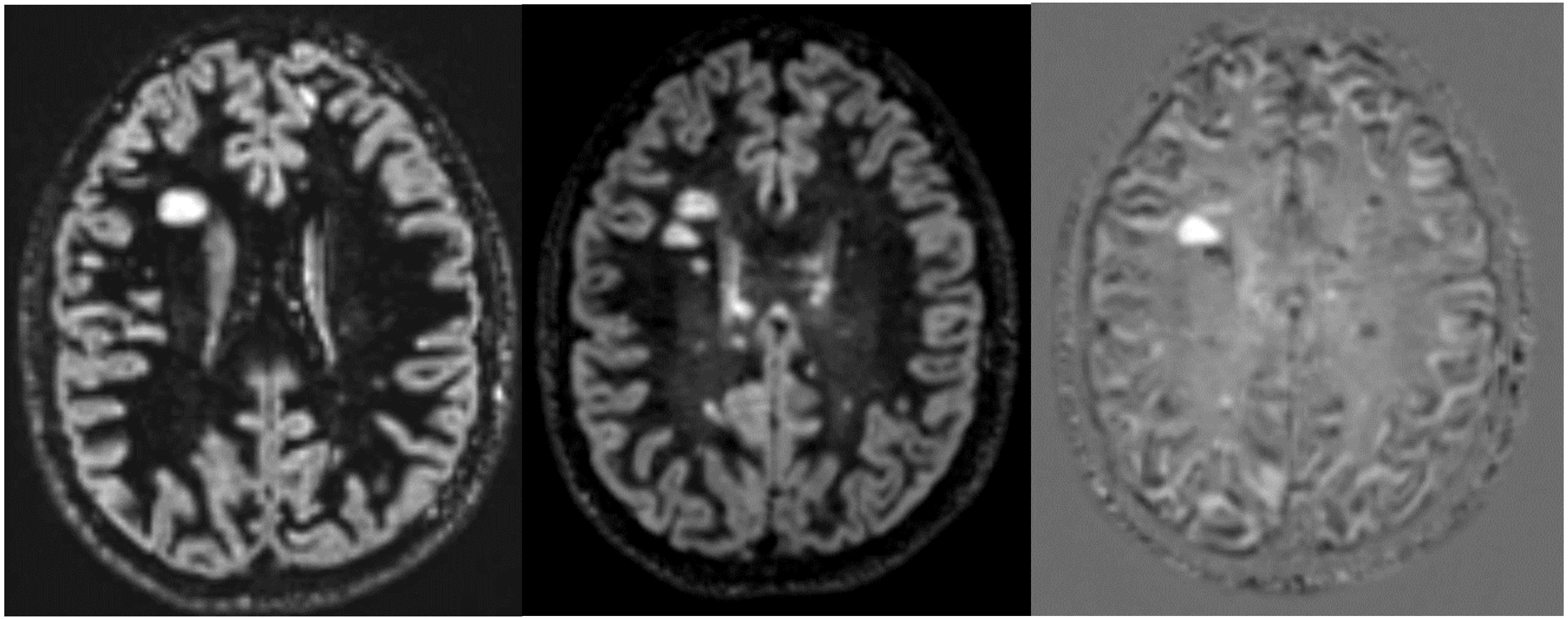
Applications in radiology

- Where do we have excellent groundtruth data?
- Define „unmet needs“:
  - What is boring?
  - Is boredom a source of error?
  - What is time-consuming?
  - In which areas is radiology not good?
- Define the data lake
- Low hanging fruits first
- More difficult tasks later on

Bone age prediction

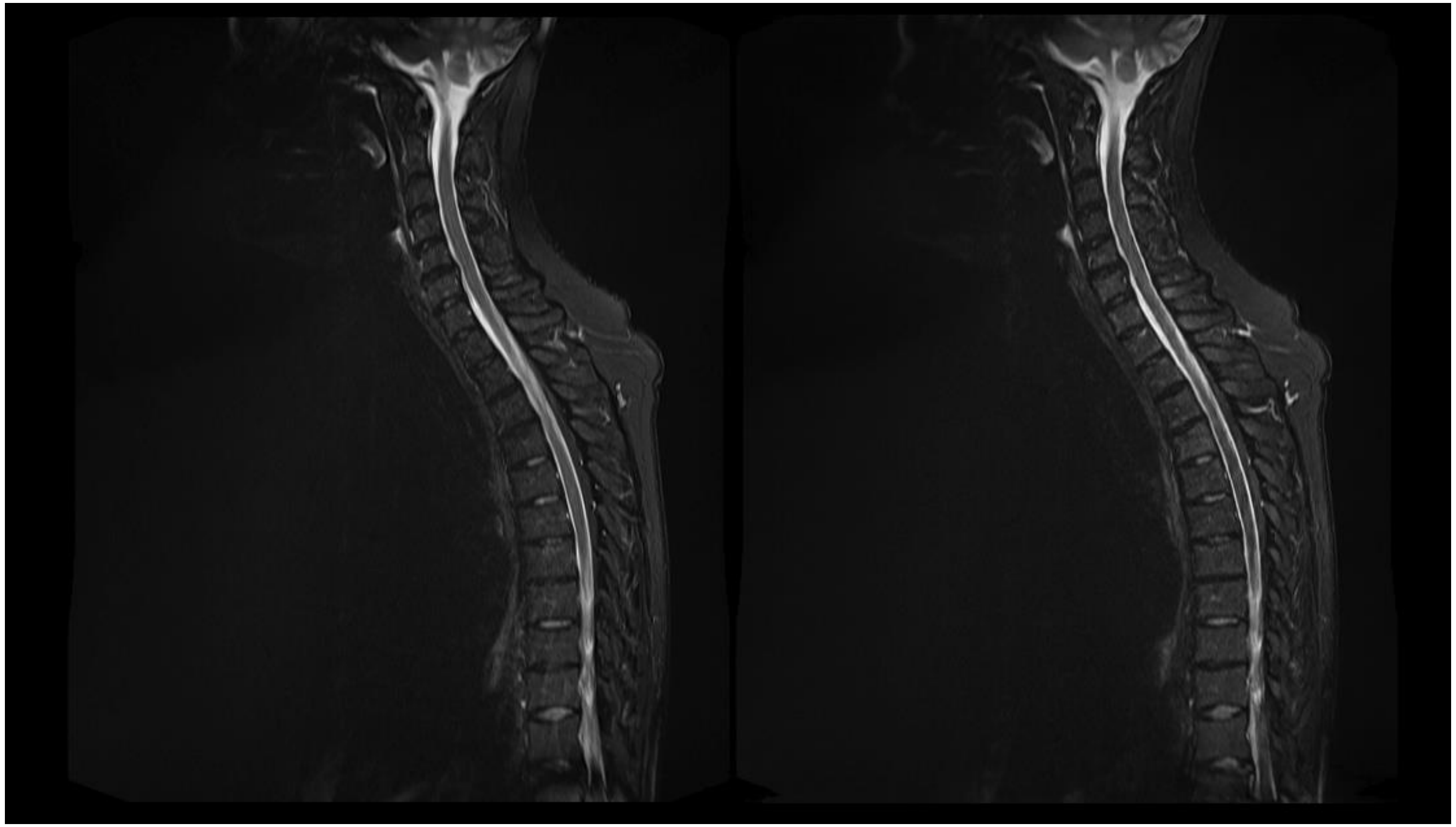


Subtraction of MS plaques in F-U examinations



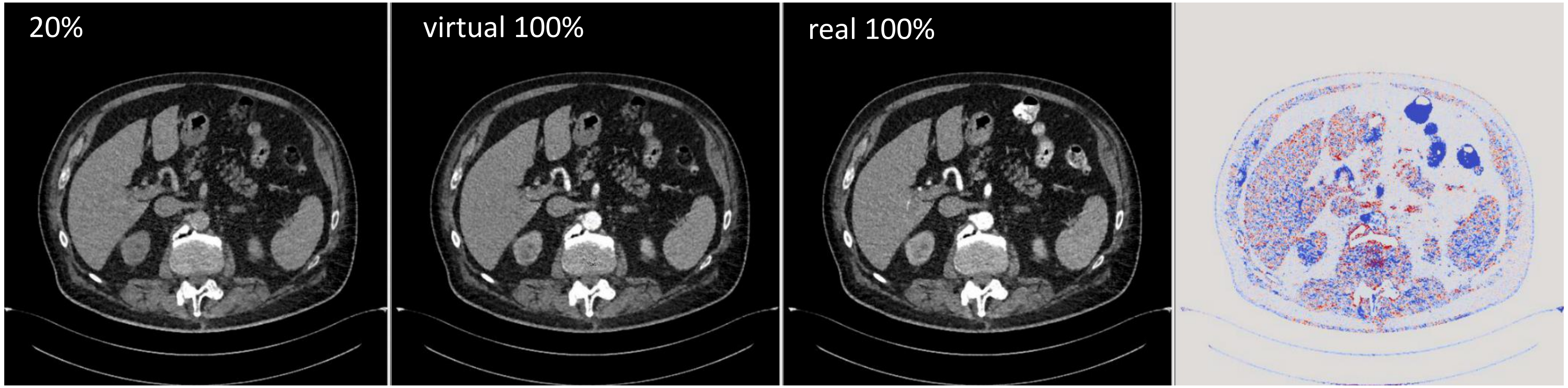
What does the neurologist want to know?

Virtual sequences (STIR): Reduction of time; reduction of problems in standardisation

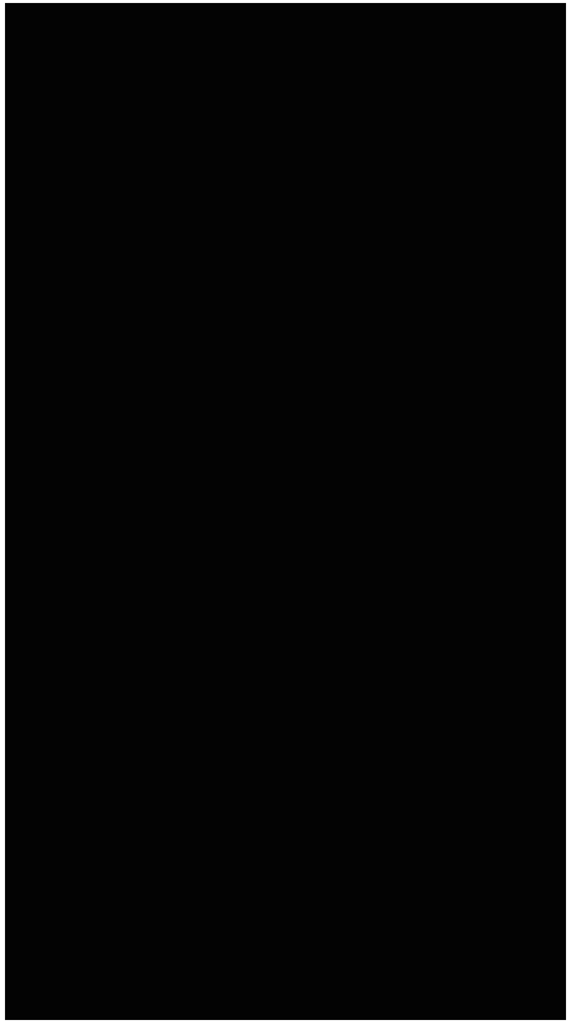


Virtual sequences (STIR): Reduction of time; reduction of problems in standardisation

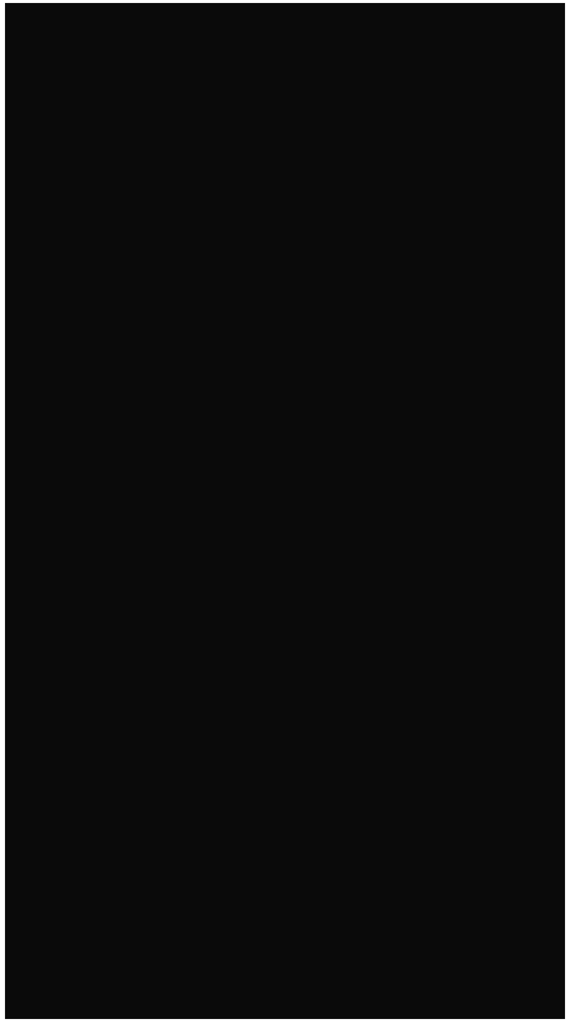
Contrast media dose reduction



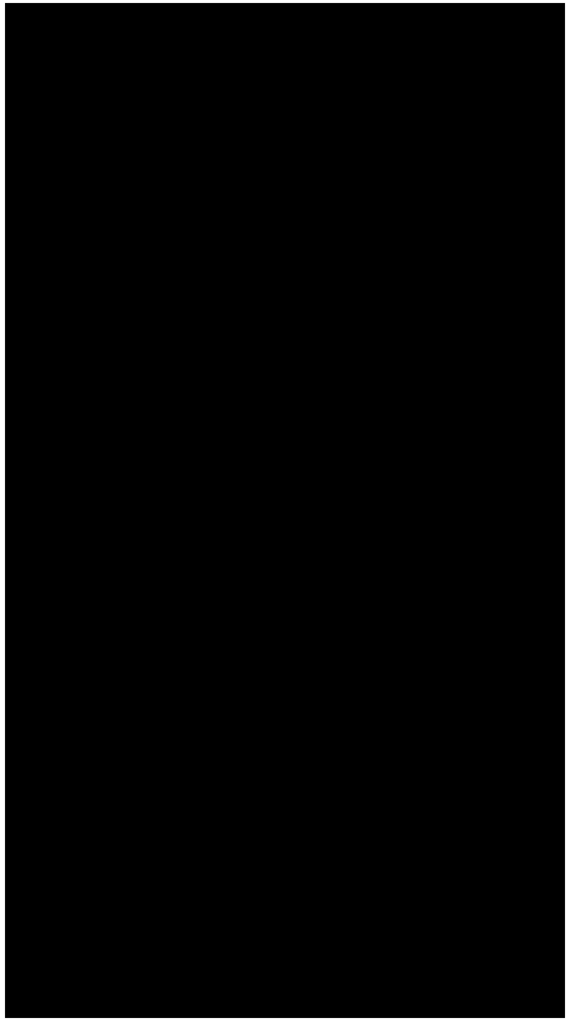
Virtual Contrast Agent Prediction Normal



T1w
native

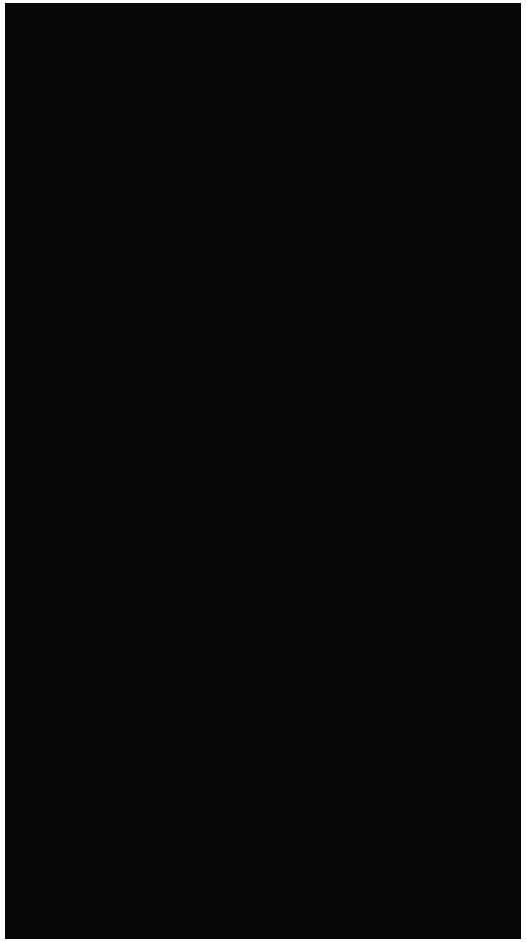


ceT1w
groundtruth

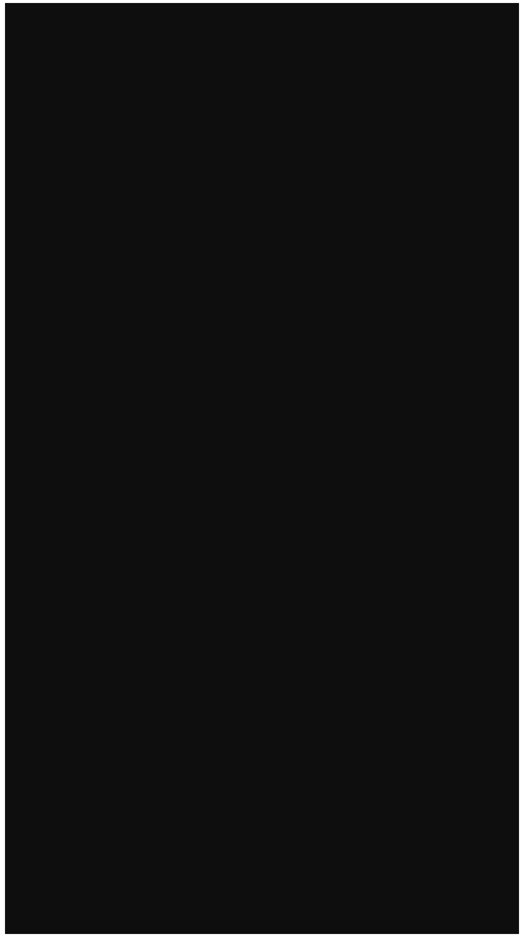


vT1w
predicted

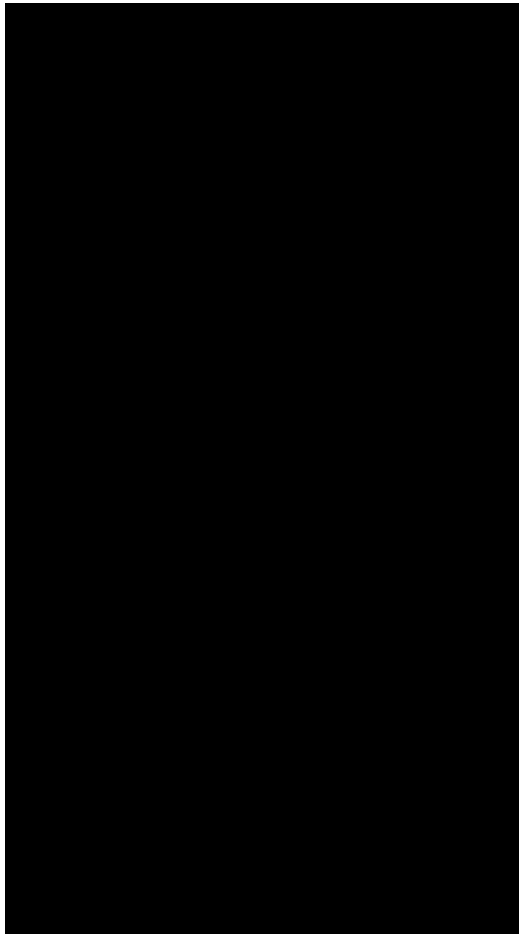
Virtual Contrast Agent Prediction Tumor



T1w
native



ceT1w
groundtruth

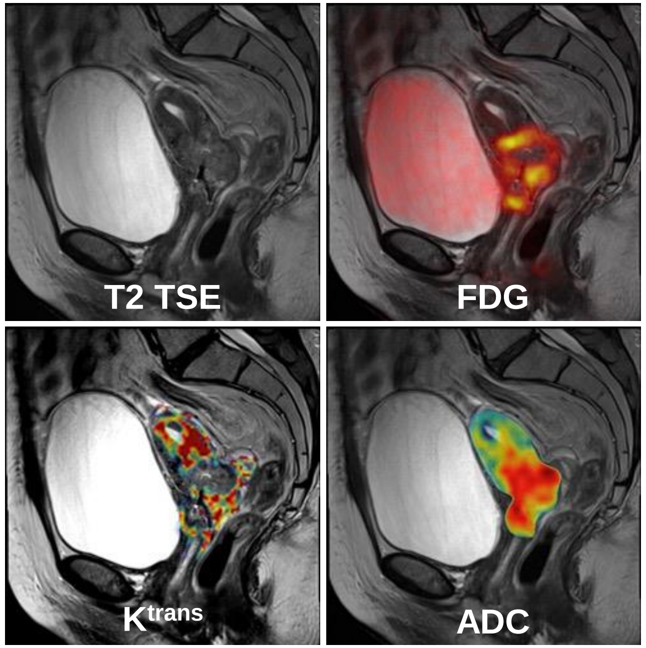


vT1w
predicted

How can we improve radiology?

- Gain more infomation from pixels

PET/MRT Radiomics

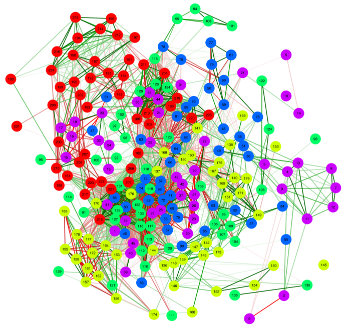


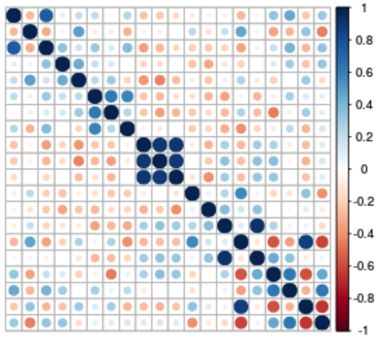
M-stage

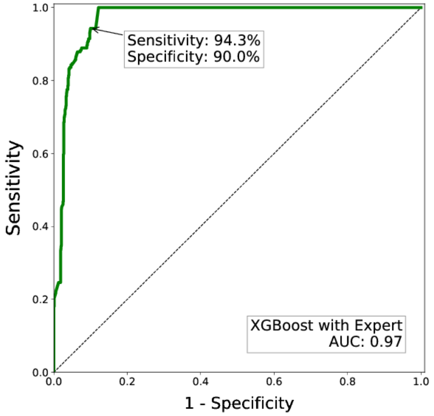
Name	P	P_{adj}
T2_TSE_glcm_differenceEntropy	0.0000	0.00
T1_Nativ_glcm_differenceEntropy	0.0002	0.02
T2_TSE_glcm_correlation	0.0005	0.05
Ktrans_1616_calc_min	0.0009	0.09
T2_TSE_glcm_energy	0.0019	0.19
T2_TSE_glrlm_LRE	0.0019	0.19
ADC_glcm_contrast	0.0083	0.82
PET_glcm_correlation	0.0083	0.82
PET_glcm_IDMN	0.0098	0.97
ADC_glcm_IDMN	0.0115	1.00
ADC_glcm_inverseVariance	0.0156	1.00
T1_Nativ_glcm_correlation	0.0210	1.00
Ktrans_1616_glcm_cShade	0.0210	1.00
T1_Nativ_glrlm_LRLGLE	0.0241	1.00
PET_glcm_contrast	0.0241	1.00
ADC_calc_uniformity	0.0277	1.00
PET_glrlm_LRE	0.0277	1.00
Ktrans_1616_calc_median	0.0299	1.00
T2_TSE_calc_skewness	0.0317	1.00
ADC_calc_entropy	0.0317	1.00

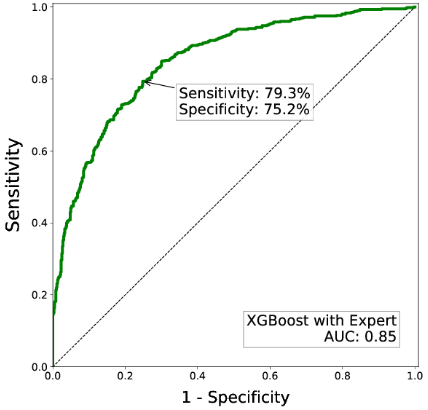
N-stage

Name	P	P_{adj}
PET_calc_median	0.0001	0.01
T2_TSE_glcm_correlation	0.0005	0.05
PET_calc_energy	0.0008	0.08
PET_glrlm_LRHGLE	0.0008	0.08
ADC_glcm_autoCorrelation	0.0013	0.13
Ktrans_1616_glcm_cShade	0.0013	0.13
ADC_calc_skewness	0.0016	0.16
T2_TSE_glcm_differenceEntropy	0.0023	0.22
ADC_glcm_cProminence	0.0023	0.22
ADC_glcm_mean	0.0027	0.26
ADC_glcm_cShade	0.0032	0.31
Ktrans_1616_glcm_maxProb	0.0037	0.37
Ktrans_1616_glrlm_GLN	0.0043	0.43
ADC_glrlm_LRLGLE	0.0059	0.58
PET_calc_uniformity	0.0068	0.68
PET_calc_max	0.0068	0.68
T1_Nativ_glrlm_LRLGLE	0.0079	0.78
T2_TSE_glrlm_LRE	0.0079	0.78
PET_glcm_IDMN	0.0079	0.78
Ktrans_1616_glrlm_LRLGLE	0.0079	0.78



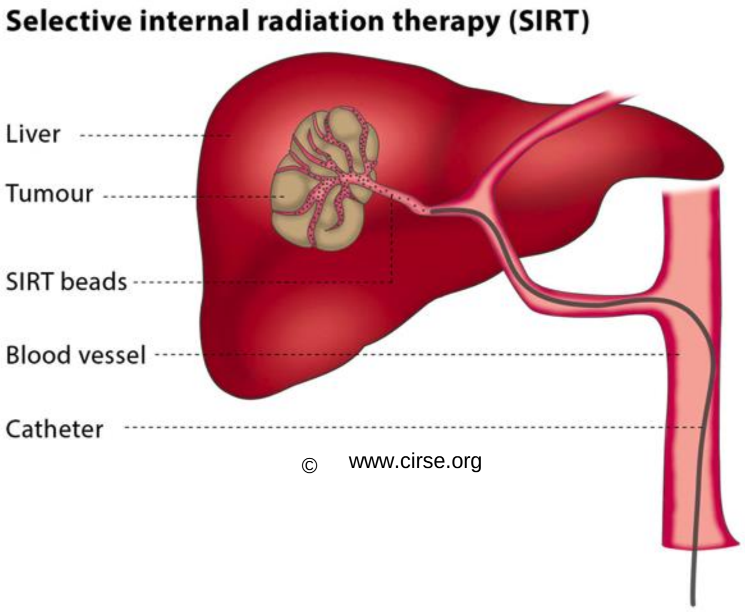






Umutlu L, Grüneisen J, Nensa F, et al. 2017. Unpublished

Selective internal radiation therapy



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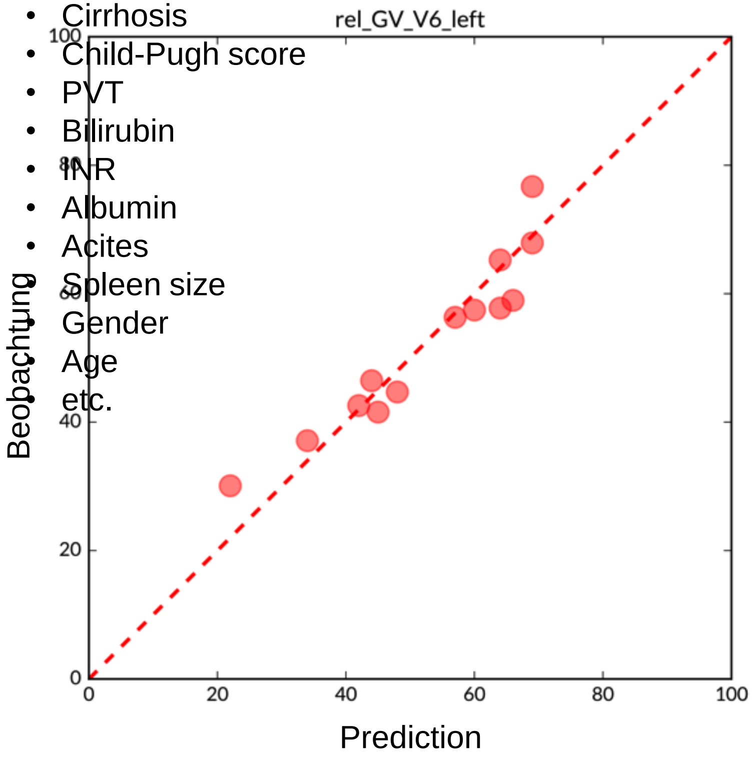
- Liver size
- Cirrhosis
- Child-Pugh score
- PVT
- Bilirubin
- INR
- Albumin
- Acites
- Spleen size
- Gender
- Age
- etc.

Growth of untreated liver part



Summary for radiology

- artificial intelligence will relieve radiologists of boring tasks
  - ➢ It'll be quick.
- AI will improve quality of radiology
  - – Radiomics: get more information from pixels
  - ➢ It'll take some time.
- AI will affect other disciplines much more than radiology

Wo wird KI die grössten Veränderungen bringen?

communi
care

Longitudinales Curriculum
Sprechende Medizin

- Technische Disziplinen sind fehlerfrei
- „Sprechende Medizin“ ist hypothesengetrieben und macht viele Fehler

Kahneman-Zitat

(Nobelpreisträger für Behavioural Economics)

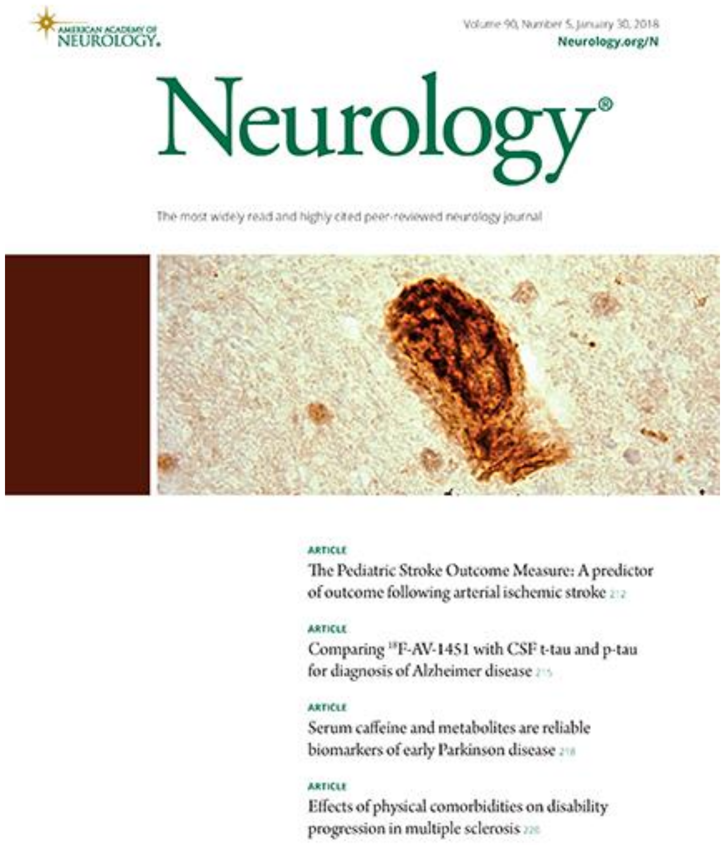
Der Mensch ist nicht in der Lage, statistisch-quantitative Entscheidungen permanent gut genug zu treffen und lässt sich häufig täuschen (meist durch Optimismus).

Lange Liste von typischen Denkfehlern:
http://en.wikipedia.org/wiki/List_of_cognitive_biases

Die optimistische Annahme: „Wird schon in mein Fachgebiet gehören“

- Kardiologie
- Neurochirurgie
- Orthopädie
- Angiologie
- ….

AI will change other disciplines even more than radiology



REGULAR ARTICLE | OPEN ACCESS

Instagram photos reveal predictive markers of depression

Andrew G Reece and Christopher M Danforth

EPJ Data Science 2017 **6**:15 | https://doi.org/10.1140/epjds/s13688-017-0110-z | © The Author(s) 2017
Received: 28 March 2017 | **Accepted:** 22 June 2017 | **Published:** 8 August 2017

The Erratum to this article has been published in *EPJ Data Science* 2017 **6**:21

Abstract

Using Instagram data from 166 individuals, we applied machine learning tools to successfully identify markers of depression. Statistical features were computationally extracted from 43,950 participant Instagram photos, using color analysis, metadata components, and algorithmic face detection. Resulting models outperformed general practitioners' average unassisted diagnostic success rate for depression. These results held even when the analysis was restricted to posts made before depressed individuals were first diagnosed. Human ratings of photo attributes (happy, sad, etc.) were weaker predictors of depression, and were uncorrelated with computationally-generated features. These results suggest new avenues for early screening and detection of mental illness.

Predicting Depression via Social Media

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Abstract

Major depression constitutes a serious challenge in personal and public health. Tens of millions of people each year suffer from depression and only a fraction receives adequate treatment. We explore the potential to use social media to detect and diagnose major depressive disorder in individuals. We first employ crowdsourcing to compile a set of Twitter users who report being diagnosed with clinical depression, based on a standard psychometric instrument. Through their social media postings over a year preceding the onset of depression, we measure behavioral attributes relating to social engagement, emotion, language and linguistic styles, ego network, and mentions of antidepressant medications. We leverage these behavioral cues, to build a statistical classifier that provides estimates of the risk of depression, *before* the reported onset. We find that social media contains useful signals for characterizing the onset of depression in individuals, as measured through decrease in social activity, raised negative affect, highly clustered

laboratory test for diagnosing most forms of mental illness; typically, the diagnosis is based on the patient's self-reported experiences, behaviors reported by relatives or friends, and a mental status examination.

In the context of all of these challenges, we examine the potential of social media as a tool in detecting and predicting affective disorders in individuals. We focus on a common mental illness: Major Depressive Disorder or MDD[1]. MDD is characterized by episodes of all-encompassing low mood accompanied by low self-esteem, and loss of interest or pleasure in normally enjoyable activities. It is also well-established that people suffering from MDD tend to focus their attention on unhappy and unflattering information, to interpret ambiguous information negatively, and to harbor pervasively pessimistic beliefs (Kessler et al., 2003; Rude et al., 2004).

People are increasingly using social media platforms,

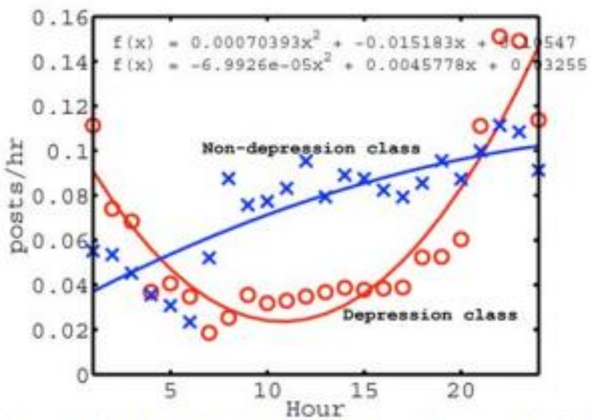


Figure 2: Diurnal trends (i.e. mean number of posts made hourly throughout a day) for the two classes. The line plots correspond to least squares fit of the trends.

FACE PROFILE BY MAREK POLAKOVIC, SK | NOUN PROJECT

Depression detector

Analyzing speech patterns can predict if a subject is depressed.

by Rob Matheson October 23, 2018

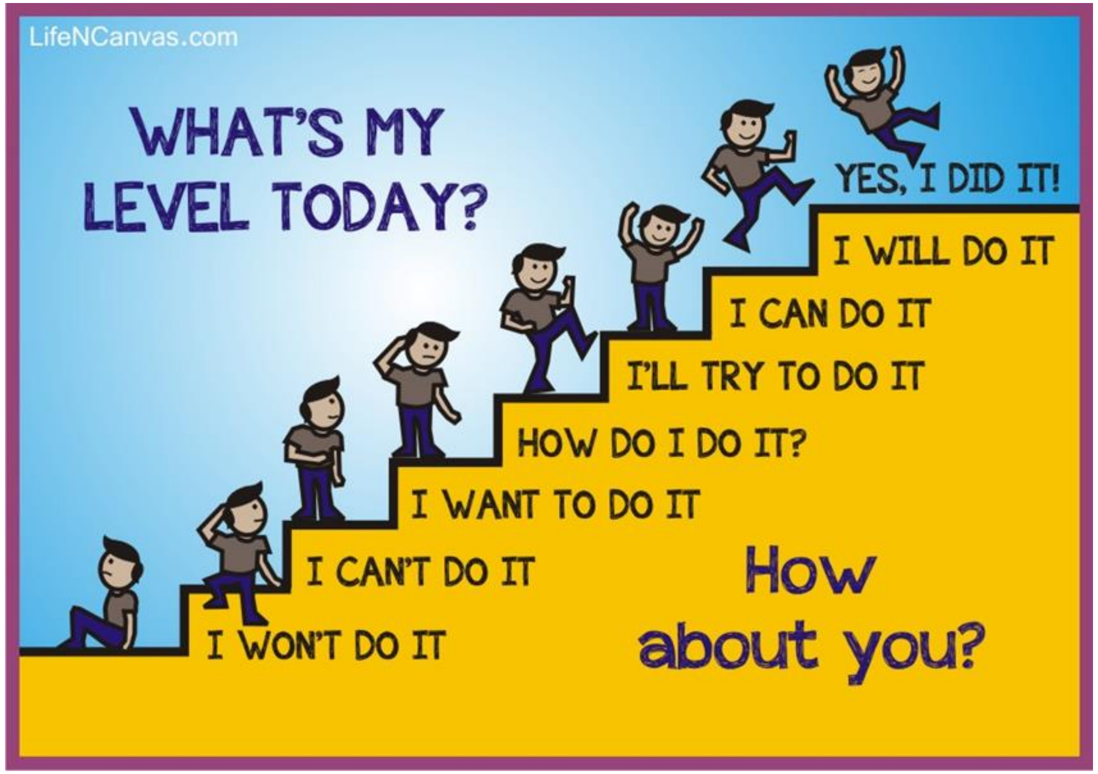
To diagnose depression, clinicians interview patients, asking specific questions—about, say, past mental illnesses, lifestyle, and mood.

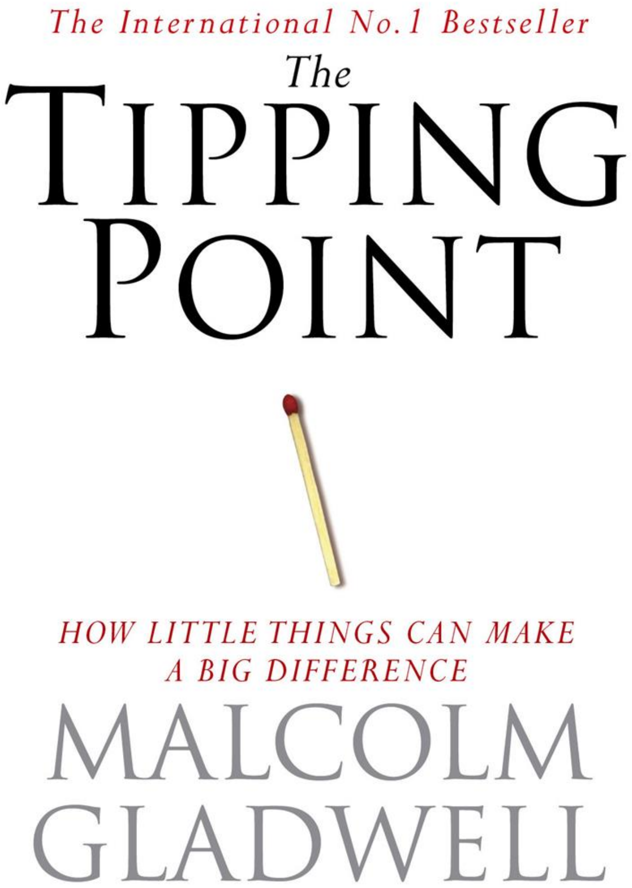
Machine learning that can detect words and intonations associated with depression could help with diagnostics. But such models tend to predict depression from the person's specific answers to very specific questions.

A new neural-network model developed at MIT can be unleashed on raw text and audio data from interviews to discover speech patterns indicative of depression. Given a new subject, it can accurately predict whether the individual is depressed without needing any other information about the questions and answers.

"The model sees sequences of words or speaking style, and determines that these patterns are more likely to be seen in people who are depressed or not depressed," says EECS graduate student and CSAIL

Fazit


LifeNCanvas.com
WHAT'S MY LEVEL TODAY?
YES, I DID IT!
I WILL DO IT
I CAN DO IT
I'LL TRY TO DO IT
HOW DO I DO IT?
I WANT TO DO IT
I CAN'T DO IT
I WON'T DO IT
How about you?


The International No.1 Bestseller
The TIPPING POINT
HOW LITTLE THINGS CAN MAKE A BIG DIFFERENCE
MALCOLM GLADWELL

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GESCHICHTE DER ZUKUNFT
Prognosen, Visionen, Irrungen in Deutschland von 1945 bis heute
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