



Universiteit  
Leiden

The Netherlands

## Applied machine learning in neurosurgical oncology

Senders, J.T.

### Citation

Senders, J. T. (2022, January 27). *Applied machine learning in neurosurgical oncology*. Retrieved from <https://hdl.handle.net/1887/3254401>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3254401>

**Note:** To cite this publication please use the final published version (if applicable).

Propositions belonging to the thesis titled

# APPLIED MACHINE LEARNING *in* NEUROSURGICAL ONCOLOGY

- 1) Even in the realm of predictive analytics, machine learning does not automatically outperform traditional statistical methods (*This thesis*)
- 2) Traditional statistical algorithms remain well-suited for structured data sets with clinically interpretable variables, whereas deep learning allows for automated pattern recognition in high-dimensional data structures (*This thesis*)
- 3) If clinical experts can agree upon the definitions of clinical concepts, a machine can be taught to recognize and extract these concepts from free-text clinical reports (*This thesis*)
- 4) Predictive analytics remains an asymptote for which perfection will never be reached (*This thesis*)
- 5) Medicine is still all about treating populations, not people - one-size-fits all treatments and diagnoses (*Eric Topol, 2012*)
- 6) There is never a specific threshold wherein a model suddenly becomes “machine learning”; rather, all of these approaches exist along a continuum, determined by how many human assumptions are placed onto the algorithm (*Andrew L. Beam, 2018*)
- 7) We will get away from keyboards in the office, also known as “death by a thousand clicks,” and replace them with computer processing of natural language into notes (*Eric Topol, 2014*)
- 8) Before we hold computerized systems (or humans) up against an idealized and unrealizable standard of perfection, let our benchmark be the real-world standards of care whereby doctors grossly misestimate the positive predictive value of screening tests for rare diagnoses, routinely overestimate patient life expectancy by a factor of 3, and deliver care of widely varied intensity in the last 6 months of life (*Jonathan H. Chen, 2018*)
- 9) Because the brain mediates our experience of the world, any neurosurgical problem forces a patient and family, ideally with a doctor as a guide, to answer this question: What makes life meaningful enough to go on living? (*Paul Kalanithi, 2016*)
- 10) Your assumptions are your windows on the world. Scrub them off every once in a while, or the light won't come in (*Isaac J. Asimov, 1980*) – *The assumptions we make about the world transform the way we perceive it; hence, we should periodically challenge our own assumptions.*
- 11) Keep it simple and focus on what matters (*Confucius, 6<sup>th</sup> century b.c. and echoed by Sen Han, 2020*) – *In both natural and artificial intelligence, simplicity is fundamental for discerning meaningful signal underlying the (statistical) noise.*
- 12) It's on when it's on (*Padang Padang, 1991*) – *Keep an eye out for opportunities and go for it without excuses whenever one occurs.*