**1.5 Automated Machine Learning (AutoML)**

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A similar presentation slides previously presented by vdS (<https://www.lshtm.ac.uk/sites/default/files/2019-12/csm-seminar-slides-and-audio-transforming-medicine-and-healthcare.pdf>)

**Why do we need AutoML?**

* Article written by vdS: AutoML:powering the new human-machine learning ecosystem
  + <https://www.vanderschaar-lab.com/automl-powering-the-new-human-machine-learning-ecosystem/>
* Patients are complex:
  + Goal: develop holistic view of patients’ health
    - Risk scores for actionable clinical conditions
  + Developing Clinical Analytics: Challenges
    - Model are not “one size fits all” solutions – which one to choose?
    - Reproducibility
    - Interpretability, explainability
    - Trustworthiness, uncertainty estimates
* ML solutions in healthcare

**+** high predictive accuracy for many datasets

**+** data-driven, few assumptions

**-** Many ML algorithms: Which one to choose?

**-** Many hyper-parameters

**-** Need expertise in ML

**Which ML model to choose?**

**AutoML framework for building clinical risk scores**

AutoPrognosis: <https://github.com/ahmedmalaa/AutoPrognosis>

<https://www.vanderschaar-lab.com/papers/ICML2018_AP.pdf>

Covid-19: <https://www.vanderschaar-lab.com/covid-19/>

**CVD risk model**:

PLOS 2019: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0213653>

ICD-10 diagnosis codes F01 (vascular dementia), I20-I25 (coronary/ischaemic heart diseases), I50 (heart failure events, including acute and chronic systolic heart failures), and I60-I69 (cerebrovascular diseases), or any of the ICD-9 codes 410-414 (ischemic heart disease), 430-434, and 436-438 (cerebrovascular disease).

* 368 more patients (out of 4801) benefit from preventive treatment
  + Modest increase
* Patients with diabetes significantly outperform Framingham score
  + Variables associated to DM patients

**Breast cancer model:**

<https://www.nature.com/articles/s42256-021-00353-8>

**AutoML in practice**

SurvivalQuilts: <https://github.com/chl8856/SurvivalQuilts>

**AutoML - Beyond classification**

Cebere Jarrett curth: <https://proceedings.mlr.press/v162/jarrett22a.html>

AutoML conference: <https://automl.cc/>

**Getting ML-powered tools in the hands of clinicians: Adjutorium framework**

Mandatory rules: dataset types, dataset information

= outcomes,