Applications of machine learning

in healthcare in Brazil

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Laboratório de Big Data e Análise Preditiva em Saúde

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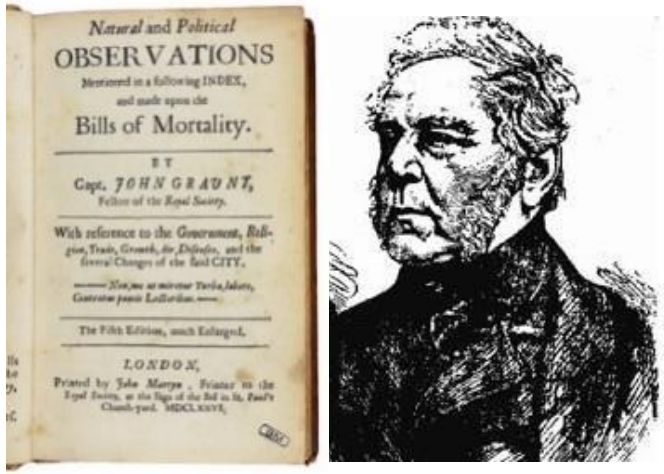
Is it possible to predict who is going to die and from which disease?


Natural and Political
OBSERVATIONS
Bills of Mortality.
BY
Capt. JOHN GRAUNT,
With reference to the Government, Religion, Trade, Growth, &c. of this CITY.
The Fifth Edition, much Enlarged.
LONDON,

One of the oldest questions in epidemiology, since the classic mortality tables from John Graunt (1662).

Solvable problem:

- Promissing results with small data (ML tutorial recently published).

- Access to a large longitudinal study (over 10 years of follow-up).

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Machine learning to predict 30-day quality-adjusted survival in critically ill patients with cancer.

dos Santos HG, Zampieri FG, Normilio-Silva K, Cavalcanti AB, Chiavegatto Filho ACF.

Journal of Critical Care 2019. 2(55):73-78

- Predict < 30 days QALY for 777 cancer patients in ICUs.
- 27 variables.
- Six machine learning algorithms: artificial neural networks, decision trees, regular and penalized logistic regression, random forests, gradient boosted trees.

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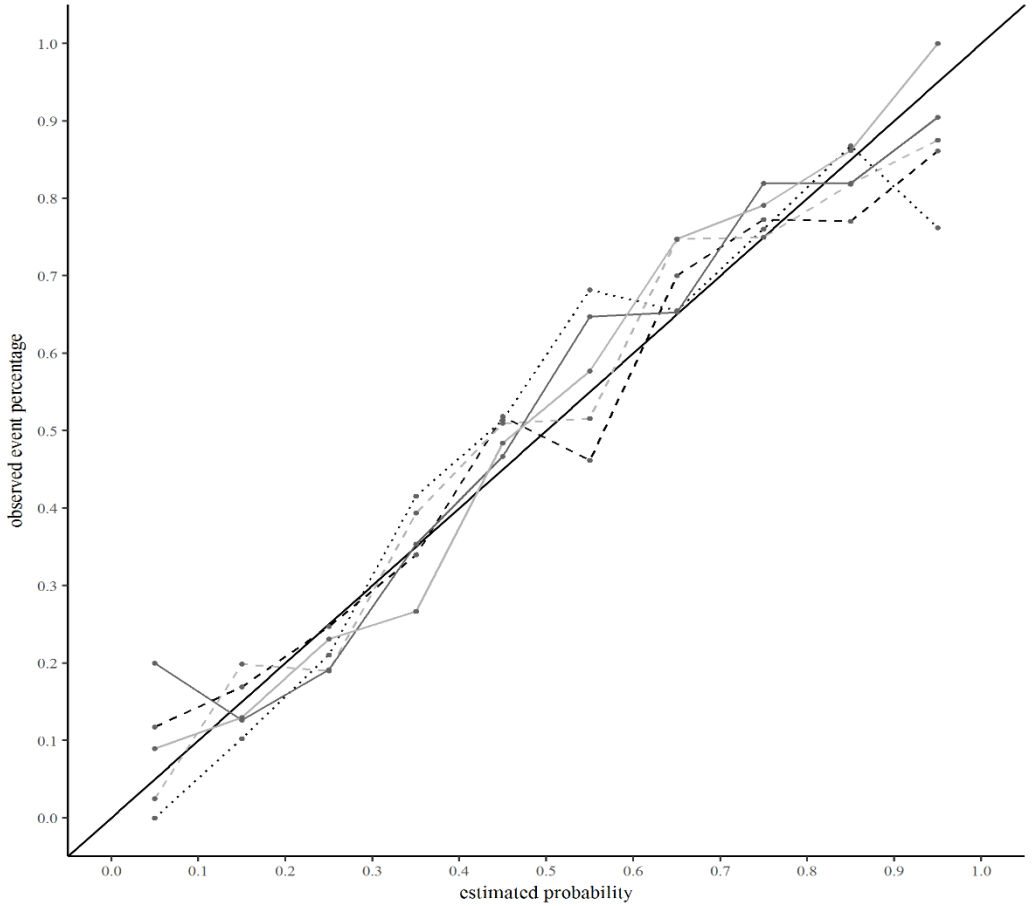
Surprising results

It is possible to predict with decent performance which patients will have less than 30 quality-adjusted days of life (AUC 0.82 for neural networks, gradient boosted trees e random forests).



Overachieving municipalities in public health: a machine learning approach

Chiavegatto Filho ADP, dos Santos HG, do Nascimento CF, Massa K, Kawachi I.

Published in *Epidemiology*

It is hard to identify good public health policies in Brazil: socioeconomic factors are very important.

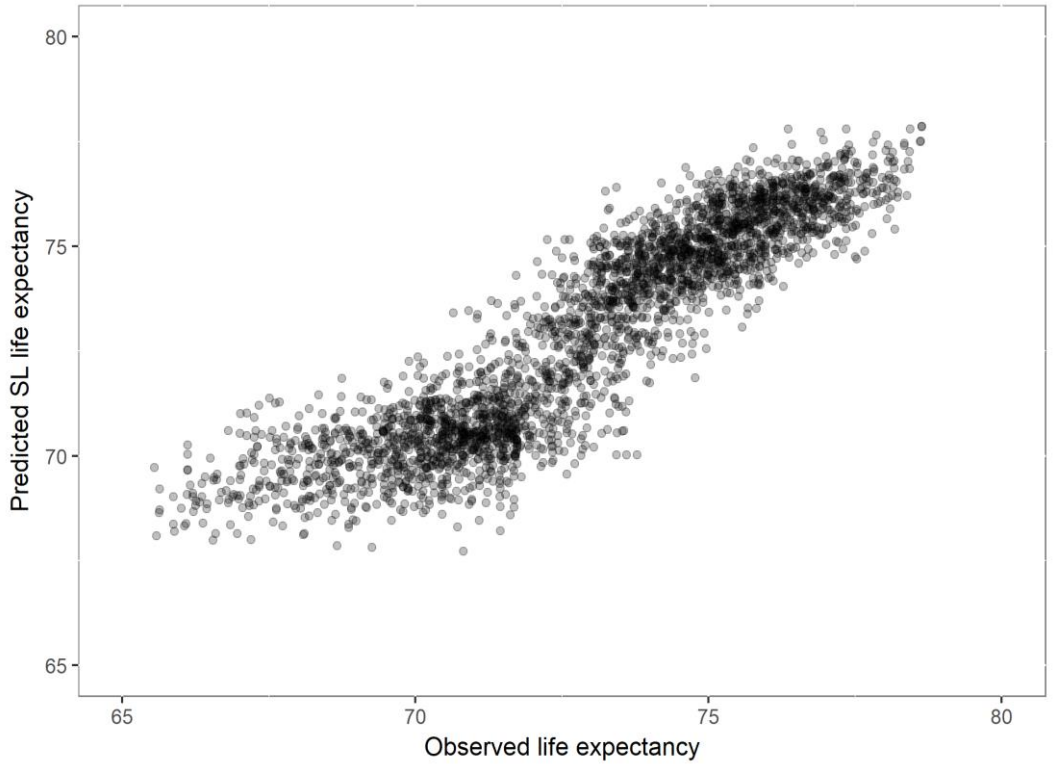
Objective

-Predict life expectancy at birth for each Brazilian municipality without using any health data (only socioeconomic and demographic).

-Identify overachievers – what are they doing differently in healthcare?

Overachieving municipalities in public health: a machine learning approach

Chiavegatto Filho ADP, dos Santos HG, do Nascimento CF, Massa K, Kawachi I.



Results:

Our algorithms predict very well life expectancy at birth in Brazil.

But there are a few *overachievers* and *underachievers*.

-What are they doing differently?

- Overachievers invest more in primary care.
- Underachievers invest more in secondary healthcare.

Current studies in my lab:

- Mortality prediction for patients with yellow fever.
- PTSD prediction after a natural disaster.
- Gestational age prediction.
- Prediction of adverse results in medical exams.
- Cognitive decline prediction for elderly patients.
- Hotspots of anomalous cancer incidences in Brazil.

Center For Artificial Intelligence (C^4AI)

World-class center on AI (largest in Brazil) at the University of São Paulo (USP).

Funding: Fapesp, IBM and USP.

Three main áreas:

- Oil and gas
- Agribusiness
- Health

Headquarters: InovaUSP

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Thank you!

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