Probabilistic Models for Cardiovascular Events

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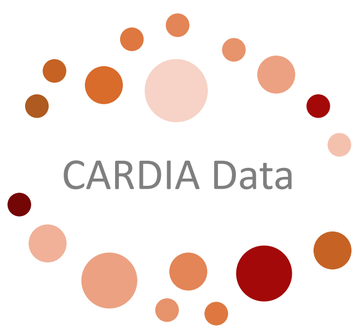
Situation

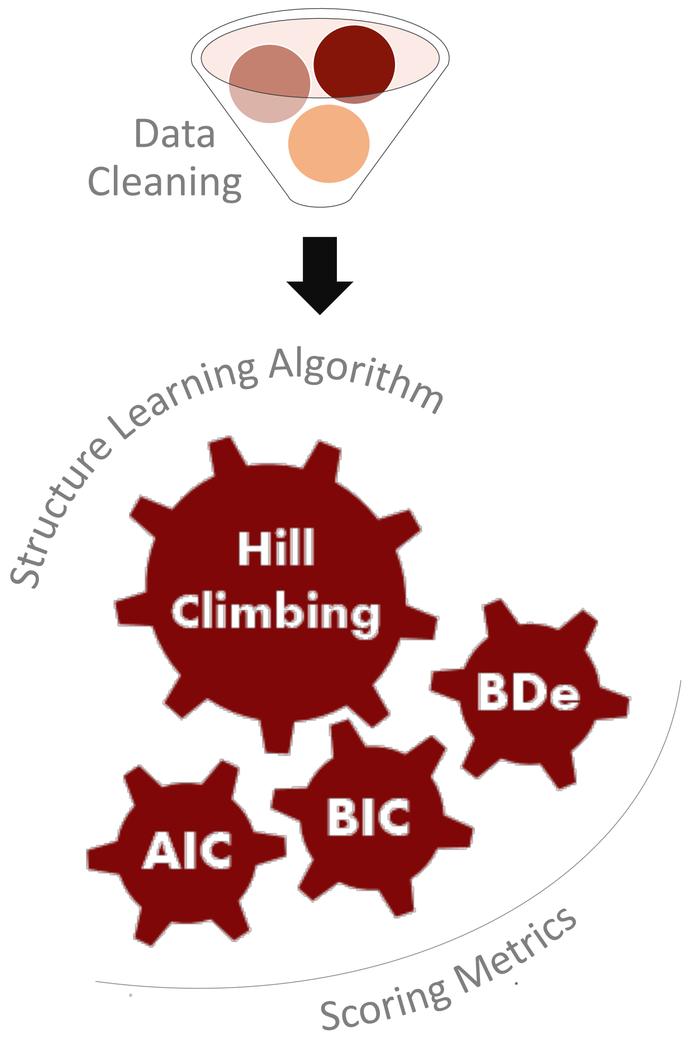
Cardiovascular Heart Disease (CHD) is directly responsible for 1 in 7 American deaths [1]. CHD is caused by the complex interactions of multiple risk factors over the course of a lifetime. Thus, studying one risk factor at a time cannot capture the full picture of CHD development.

Goals

To understand the most pertinent risk factors for CHD, we created Bayesian Networks that model the influence of 16 clinical and non-clinical measurements on Coronary Artery Calcification (CAC) , a primary indicator of CHD. We then examined interesting correlations in the data.

Methods

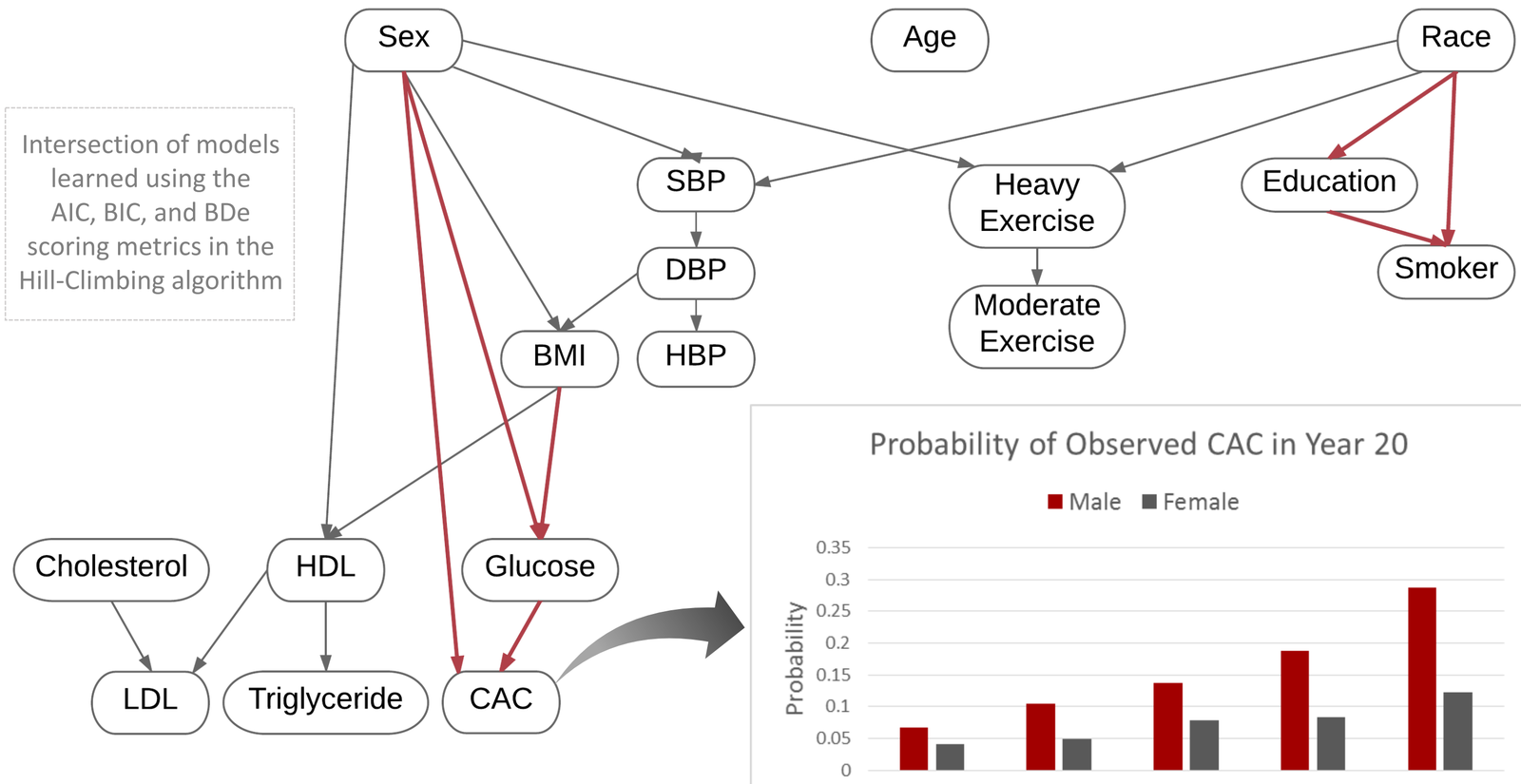




Data

- Coronary Artery Risk Development in Young Adults (CARDIA) study [2]
- Recorded clinical and non-clinical measurements
- Started in 1985-6
  - 5115 subjects
  - Ages 18 - 30
- We focused on Year 20 data
  - 72% retention rate
  - 11% of participants had observed CAC

Findings



Clinical

- Monotonic relationship between glucose levels and the probability of CAC
  - Men are much more likely to develop CAC than women
- BMI and glucose levels have a monotonic relationship
  - Men generally have a higher glucose level than women

Non-Clinical

- Race influences Education
- Likelihood of smoking decreases as education increases
  - Race influences smoking

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References

[1] Benjamin, E. J. et al. 2017. *Heart Disease and Stroke Statistics–2017 Update: A Report From the American Heart Association.*

[2] Friedman, G. et al. 1988. Cardia: study design, recruitment, and some characteristics of the examined subjects. *Journal of Clinical Epidemiology.*

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