

Opening the Black Box: Discovering Hidden Variables in Type II Diabetes Prediction and Patient Modelling



Type 2 Diabetes

what people see

high blood
sugar

what people don't see

blindness
blurred vision
boils
cataracts
depression
erectile dysfunction
foot ulcers
frequent urination
glaucoma

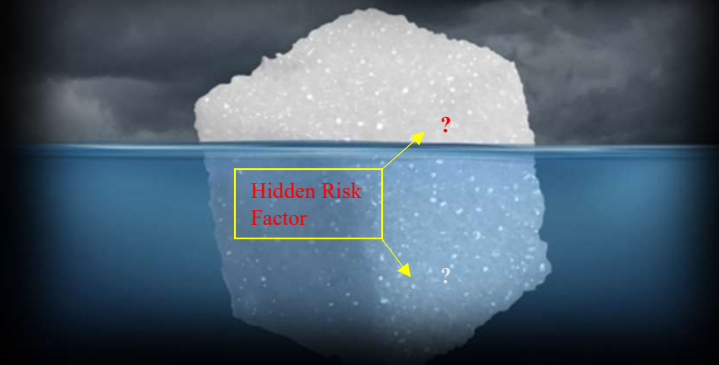
intense fatigue
intense hunger
intense thirst
itchiness
kidney disease
numbness
pain
sexual dysfunction
skin infections

The Problem

- Predicting comorbidities at the earliest from time-series data is challenging
- Each patient has a dynamic and unique profile
- Complications interact
- Many unmeasured effects, being 'Black Box in nature'
- Mining time-series data in the prognosis of disease with rare positive results
- Unexpected development of complications and varying responses of patients to disease over time.
- Need to find different groups of patients sharing similar profile of risk factors and complication co-occurrence

The solution

- ❖ Finding methods to assess the influences of these latent variables
- ❖ Discover the dependencies between the latent variable and the observed variables
- ❖ Discover Diabetic trigger and eliminate diabetes forever!
- ❖ Determining the precise position of the latent variable
- ❖ Identifying and understanding groups of patients' with similar disease profiles (based on discovered hidden variables and Temporal Association Rules)
- ❖ Uncovering Hidden variables



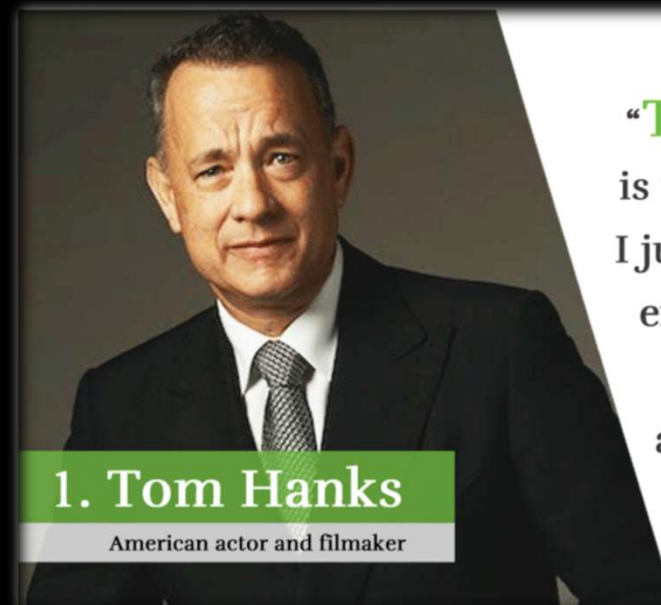
Conclusion and Future Works

- Effectively integrates Bayesian methods with latent variables by adapting the prior probability of the event occurrence for future time points
- The proposed method is more accurate than using one of hidden variable step
- Avoiding overfitting in the structure learning, using a stronger stopping rule in the step-wise approach
- Interpreting the impact of hidden variables in finding temporal phenotypes in the presence of unmeasured diabetic disorders
 - Discovering interesting dependencies between the latent variable and the observed variables
 - Applying the predictive model for each cluster of patients separately
 - Seek expert (clinicians) knowledge to interpret the results



Thank you for listening!

Any Question?



1. Tom Hanks

American actor and filmmaker

“Type 2 diabetes
is not going to kill me.
I just have to eat right,
exercise, lose weight,
watch what I eat,
and I will be fine for
the rest of my life.”