

Cell Signaling

The Problem

Prediction models for cellular enzyme levels over time are needed in the design of cell-signaling experiments. Oxidant stressors such as asbestos fibers activate enzymes such as ERK and P38. These in turn activate DNA-modifying enzymes such as TNF- α , TNF-R1 and TNF-R2 which influence cell proliferation or death.

The Approach

Neural network (NN) prediction models were chosen for modeling enzyme levels because they do not assume known parametric structure.

The Accomplishments

- Implemented NN solvers in R's Neural Network Functions and the MatLab Neural Network Toolbox
- Trained NN models to use ERK and P38 levels to predict target TNF- α , TNF-R1, and TNF-R2 levels over time
- Applied exponentially weighted moving averages to account for time lags
- Selected a 2-4-3 NN model as a good balance for capturing structure while not overfitting

