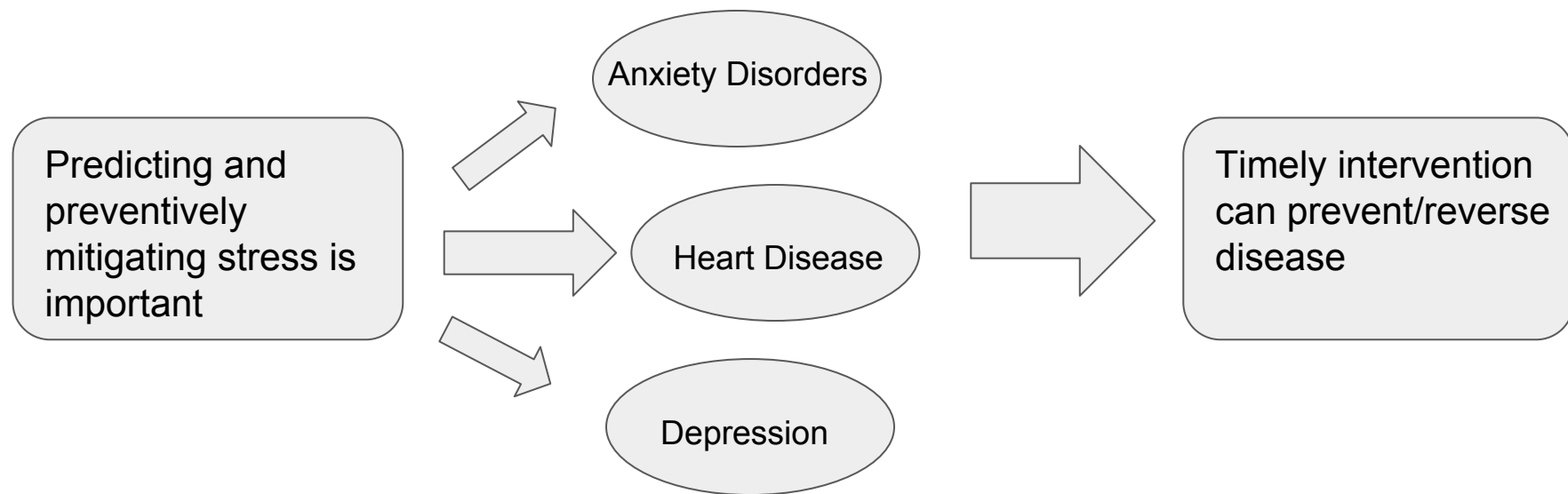


Making Stress Less Stressful

Victoria D, Sunayana R, Jeremy W

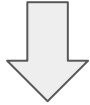
Motivation



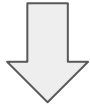
The Problem: Stress data is extremely limited, and skin conductance data is hard to collect

Dataset: Healey and Picard 2005

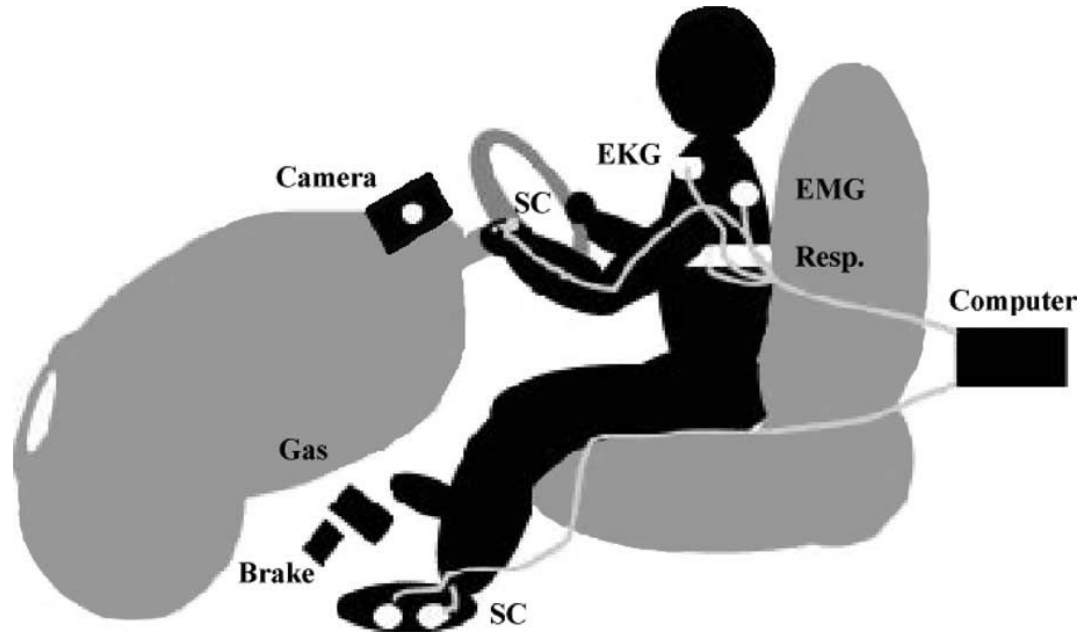
17 drivers wearing physiological sensors drive cars for ~90 minutes



Resp. Rate, Heart Rate, ECG, EMG, SC recorded every 200 ms

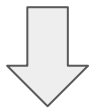


Previous work: SC found to be an extremely accurate parallel to stress

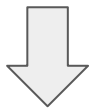


Dataset: Healey and Picard 2005

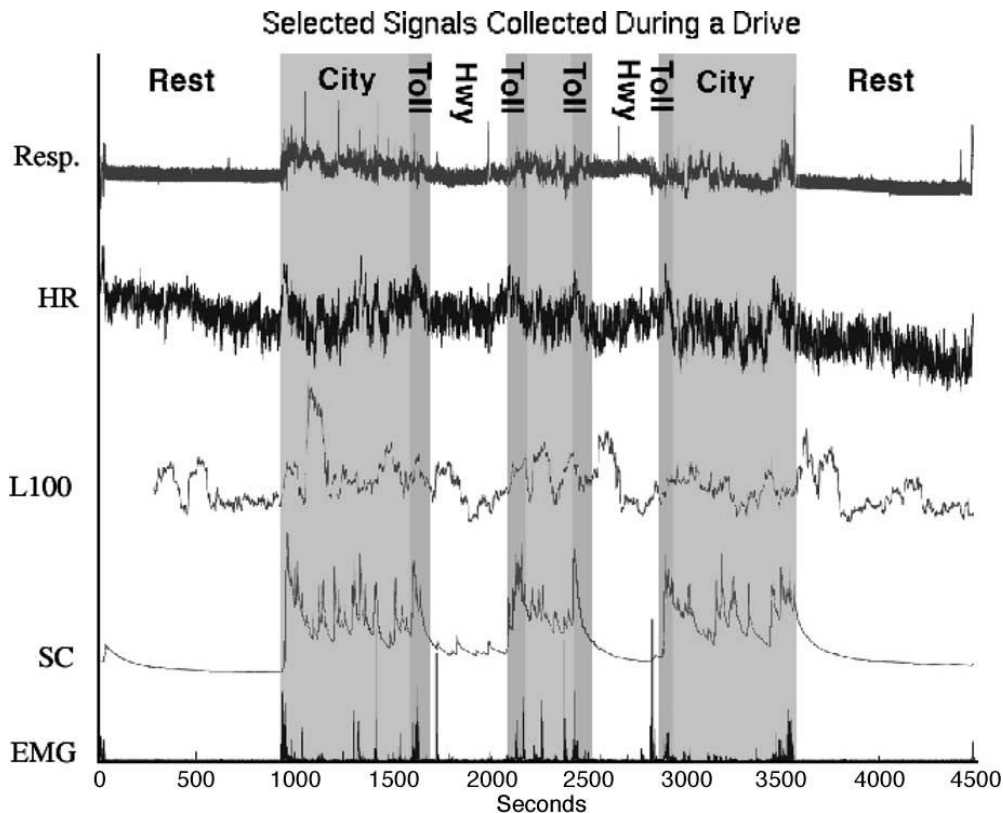
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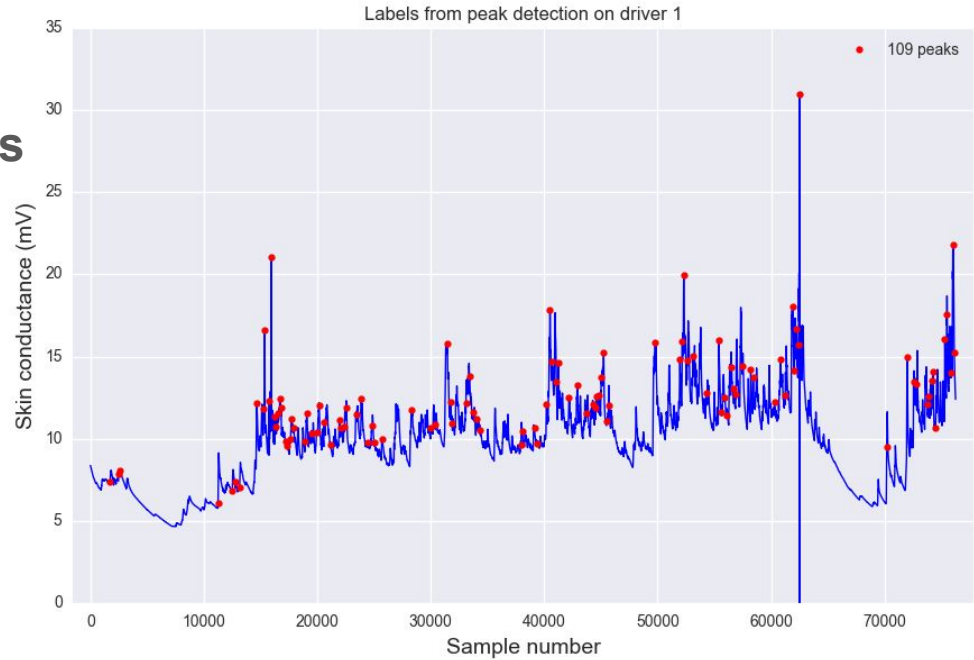


Data preprocessing

- Data imputation
- Peak finding to locate stress events
- Split up data into intervals

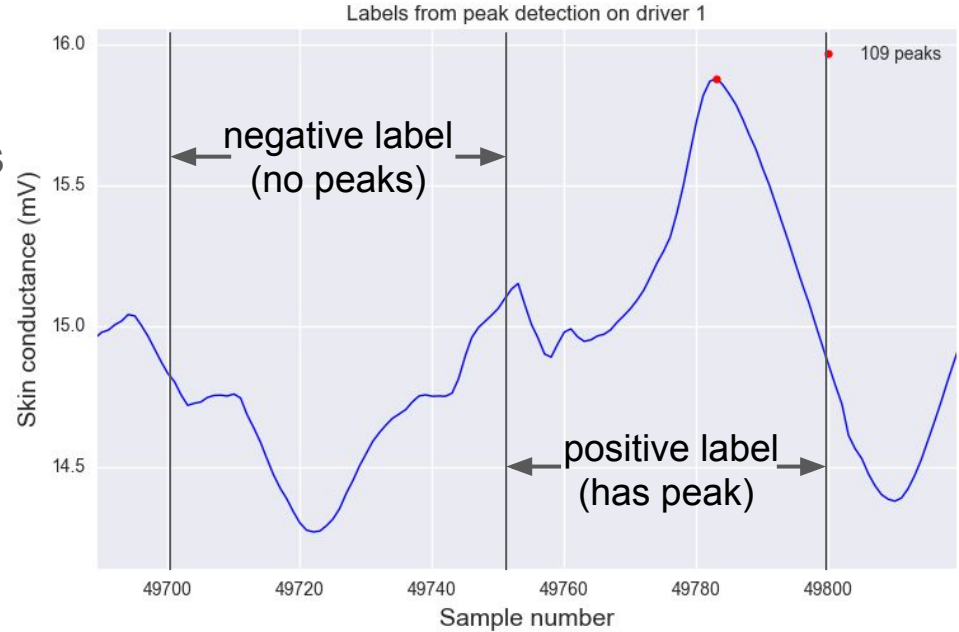
Data preprocessing

- Data imputation
- Peak finding to locate stress events**
- Split up data into intervals



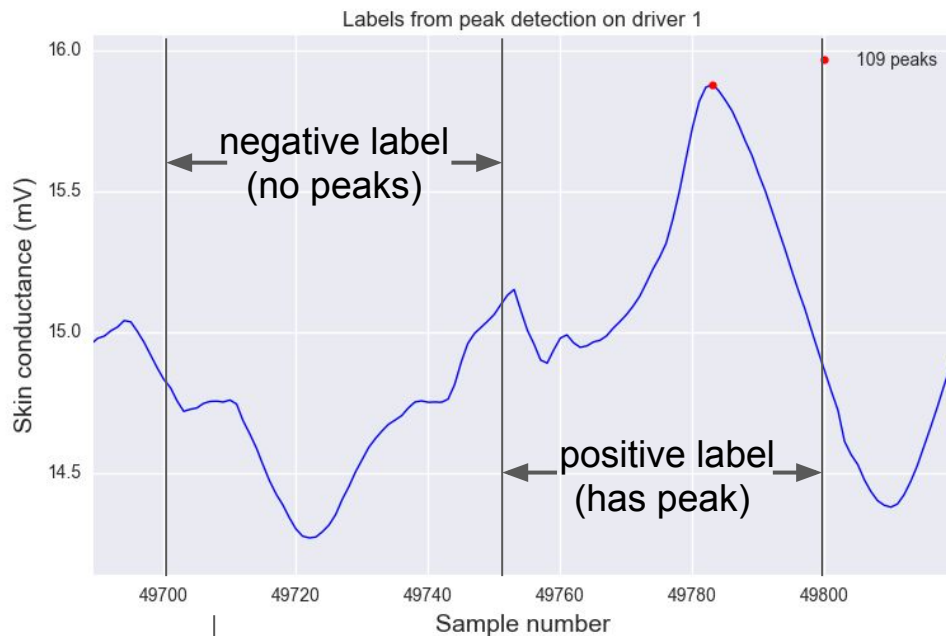
Data preprocessing

- Data imputation
- Peak finding to locate stress events
- Split up data into intervals**



Data preprocessing

- Data imputation
- Peak finding to locate stress events
- Split up data into intervals**



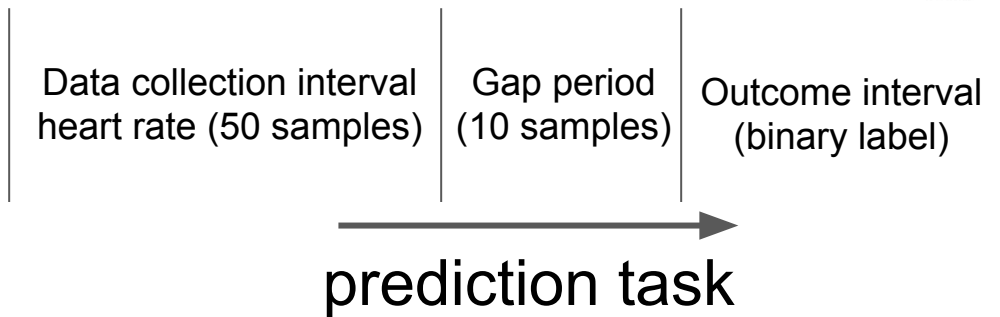
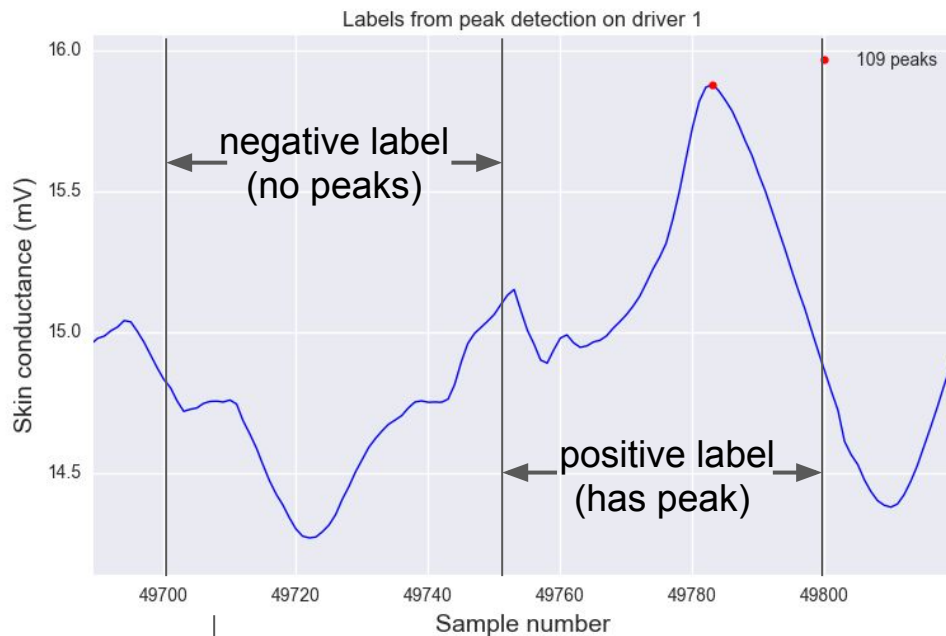
Data collection interval
heart rate (50 samples)

Gap period
(10 samples)

Outcome interval
(binary label)

Data preprocessing

- Data imputation
- Peak finding to locate stress events
- Split up data into intervals**



Models

Baselines:

- Simple thresholding
- Majority class
- Logistic Regression

Focused on 3 models:

- Random Forest
- Simple neural network
- CNN
- Decided against RNN

Simple NN architecture

Fully connected (inputs, outputs): 50 x 200

Fully connected: 200 x 2

CNN architecture

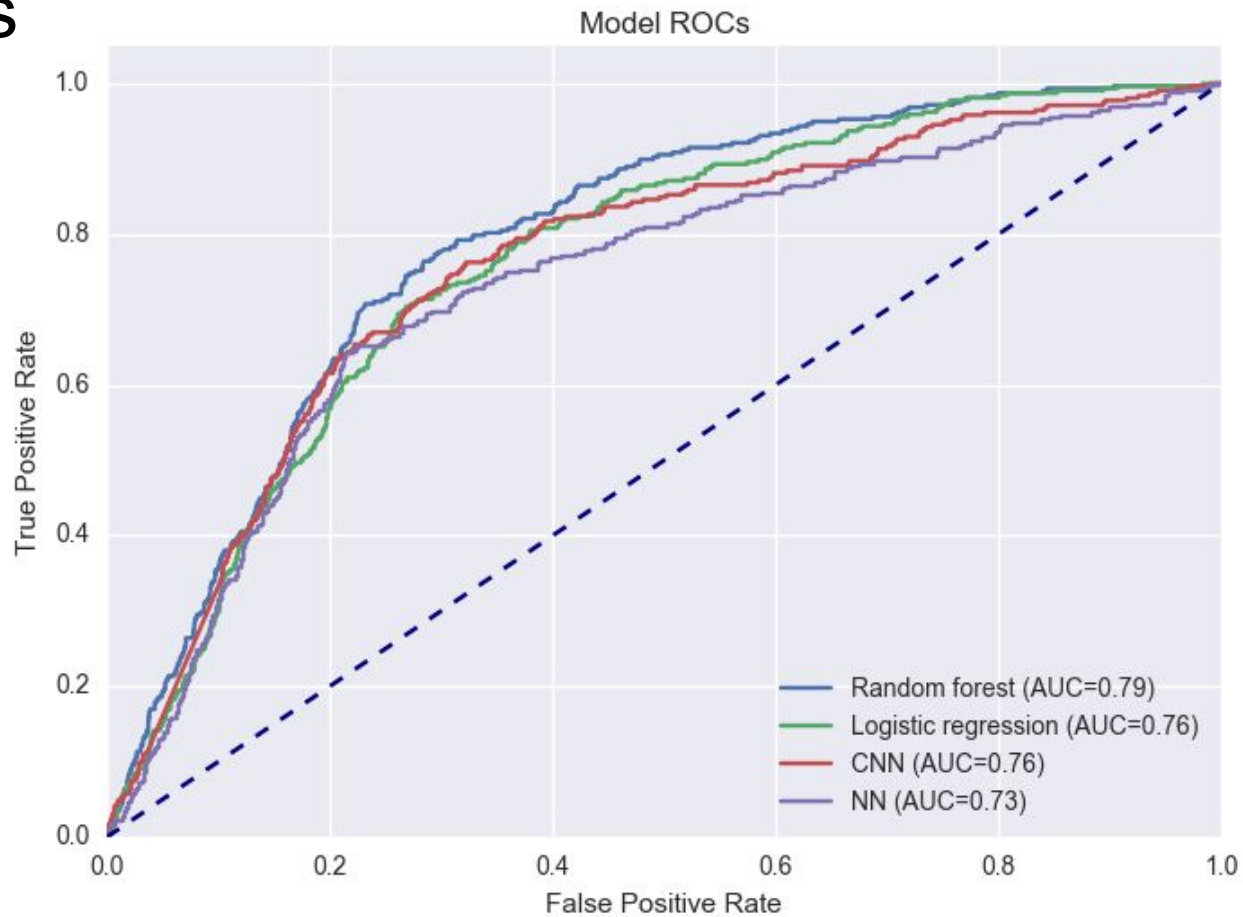
Convolution (width, height, filters): 4 x 1 x 16

Convolution: 4 x 1 x 16

Fully connected: 16 x 200

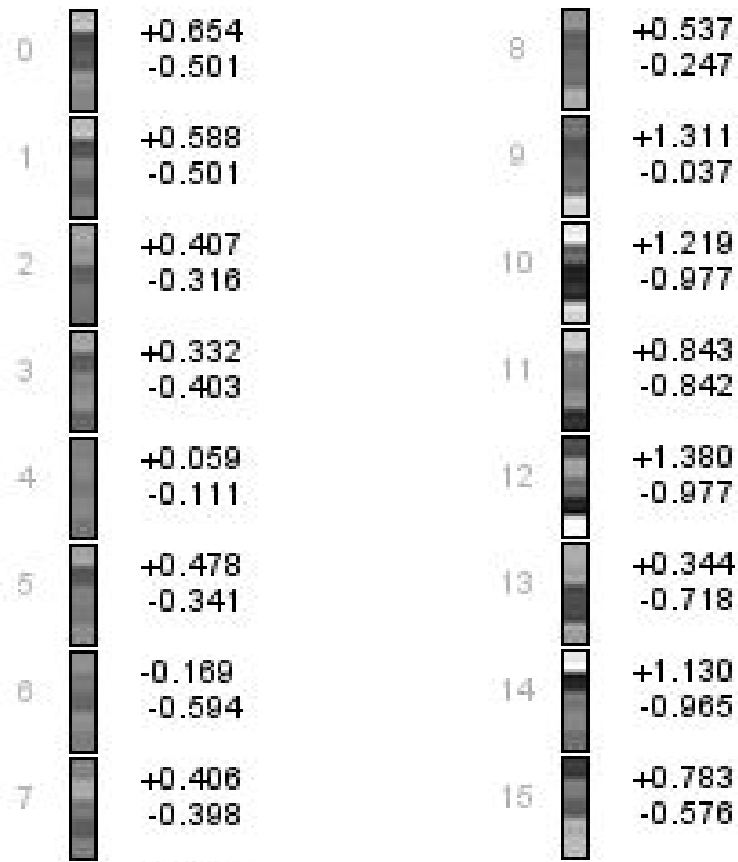
Fully connected: 200 x 2

Results



Interpretability

CNN first layer filters:



Future work

- More model optimization

Future work

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- Use other common vitals to predict skin conductance

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- Explore predicting skin conductance value instead of peaks

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- More model optimization
- Use other common vitals to predict skin conductance
- Explore predicting skin conductance value instead of peaks
- Compare stress events from driving dataset to those from other environments