Data gathered from 12 people

1–2 hours of driving

* **5 minutes of EEG signals were recorded and labeled as the normal state**
* **last 5 minutes of EEG signals were recorded and labeled as the fatigue state**

raw signals were filtered by a 50 Hz notch filter and a 0.15 Hz to 45 Hz band pass filter to

5 minutes of EEG data from 30 electrodes were sectioned into 1 s epochs approximately 300 epochs, 12 participants

Normal state: 3600 units of data

Fatigue state: 3600 units of data

Feature extraction and classifiers (data modeling and processing/parameter optimization)

* 1. feature extraction based on multiple entropy fusion

the method using AR model parameters as features by Yule-Walker was applied for comparison with the multiple entropy fusion method

* 1. PE, AE, SE, FE
  2. training + test data (equal sizes)
  3. AR modeling requires the selection of the model order number
  4. the features were normalized for each participant by scaling between -1 and 1 and adopting min-max normalization
  5. a feature-level fusion was explored to improve the detection results

**4 models**

SVM

RBF as the SVM kernel function and its two uncertain parameters

BP

Using a neural network toolbox to build a three-layer BP neural network the input layer contains 120 neurons theoutput layer contains one neuron the number of hidden layer nodes is 20

sigmoid function is employed as the transfer function of a hidden layer, and the Levenberg- Marquardt function serves as the training function

RF

number of trees and the number of input variables at each split are 500 and 22

KNN

may be suitable when many crossing or overlapping samples exist in the datasets