G2Net Detecting Continuous Gravitational Waves

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Problem Description

- Binary classification
- Determine the presence of Continuous Gravitational Waves

Dataset

- Records with measurements from two LIGO interferometers
- Positively labeled records have a simulated CGW injected
- 600 records labeled dataset
- 7975 records unlabeled test set

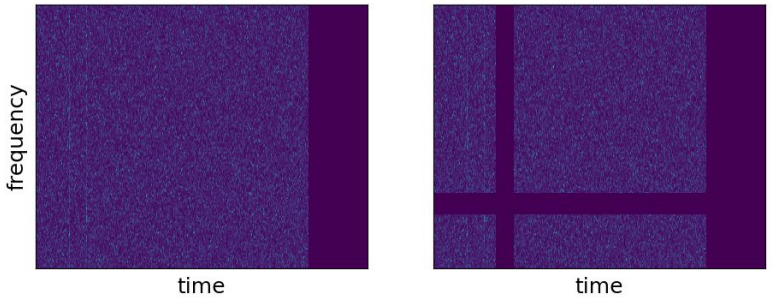

Fig 1. Spectrogram (left) and Augmentation (right)

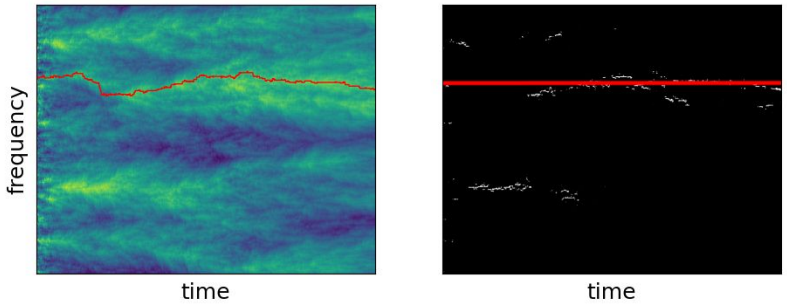

Fig 2. SOAP (left) and Hough (right)

Preprocessing and Features

- Data Augmentation
  - Time masking
  - Frequency masking
  - Warping
- Snake On A Plane algorithm to detect the most probable track
- Features describing the found track
  - Peak of time-axis sums
  - Local Binary Patterns
  - Hough transform

Machine Learning

Stacking Classifier:

- Base classifiers
  - LBP
  - Other features
- Logistic Regression

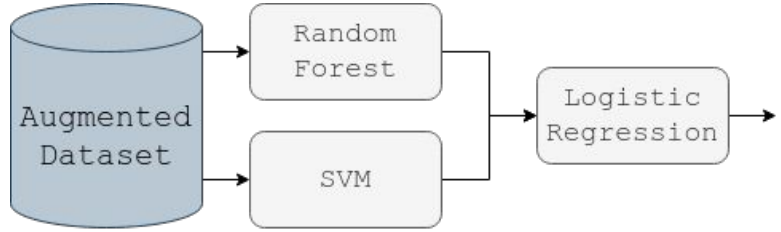

Fig 3. Ensemble architecture

Results

Validation	Test	Kaggle
0.82	0.75	0.67

Table 1. AUC-ROC scores