COMPSIG NITT

In This Issue. . .

Dear friends! COMPSIG NITT is a monthly newsletter to share the research work done in the Pattern recognition and computational intelligence laboratory, Department of Electronics and Communication Engineering, National Institute of Technology Trichy.

Concepts, Ideas pertaining to Computational intelligence, Pattern recognition and Signal processing are also included in this newsletter.

We expect the feedback, comments and articles from you all.

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Scan the QR code for previous issues of our newsletter

Wavelet Decomposition

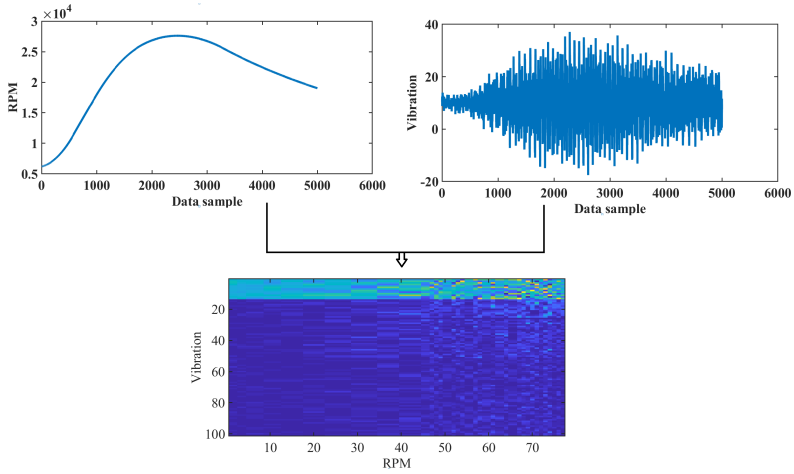

Fig.1:wavelet decomposition

Data fusion representation in image format is suitable for the performance analysis of engine health monitoring in real time applications. Campbell image representation is usually used to obtain the image format. An attempt is made to represent the engine data (rpm and vibration as the function of time) in wavelet transformation based image format using MATLAB. The image obtained for the typical data is illustrated in the Fig.1 using Daubechies family(db1) of wavelet transformation. The steps involved in obtaining the wavelet transformation based image representation are summarized below.

- The vibration data as the function of rpm is divided into subblocks.Each sub block is considered as the data corresponding to the particular rpm.
- 5000 samples is divided into 100 subblocks and each sub block contains 50 data samples in it .
- Each subblock is subjected to wavelet transformation with three level decomposition.
- The subblock data(5000 samples say) is subjected to lowpass filtering and high pass filtering and is further downsampled to obtain approximation co-efficients(2500 samples) and detailed co-effients.This is first level decomposition.The approximation co-efficients thus obtaine is further decomposed using the low pass filter and high pass filter to obtain second level approximation co-efficients(1200 samples) and the detail co-effients(1200 samples) .This is approximation 2 data is further subjected to third level decomposition.The 5000 co-efficients (approximation 3, detail 3, detail 2, and detail 1) forms the wavelet co-efficients
- In the same fashion wavelet co-efficients are collected for the remaining subblock of the vibration data.(Corresponding to the particular rpm)
- The collected data is stacked in the columnwise (against the corresponding rpm) to form the image after subjected to proper data fusion and interpolation algorithm.

Link to the M File: http://silver.nitt.edu/ esgopi/mfiles/VibrationIR/

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Workshop on Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication (MDCWC2020)

The workshop invites original research contributions/survey paper under the following categories.

1. The data driven wireless communication applications using ML, DL and Computational intelligence.
2. Optimization algorithm/technique for ML, DL and Computational intelligence.
3. Related mobile data applications.

Topics

1. Machine Learning: Multiple input multiple Output regression,Probabilistic discriminative approach, Multi-class Logistic Regression, Probabilistic generative model, Support Vector Machine, Dimensionality reduction Techniques.
2. Deep Learning: Multilayer perceptron, Boltzmann Machine, Auto-Encoders, Convolution Neural Network, Recurrent Neural Network, Generative Adversarial Network, Deep Reinforcement Learning
3. Optimization algorithm: SGD, Nesterov's momentum, Adagrad, Adadelta, RMSprop, Adam, Quantized training etc.
4. Computational Intelligence: Particle Swarm Optimization, Bacterial Foraging, Simulated Annealing, Ant Colony Technique, Genetic algorithm, Social Emotional Optimization Algorithm, Social evolutionary Learning Algorithm.
5. Mobile data applications: Mobile health care, Mobile pattern recognition, Natural language processing, Image processing.
6. Wireless Communication: Network prediction, Traffic classification, Call detail record mining, Automatic speech processing, Mobility Analysis, Indoor Localization, Energy minimization, Routing,Scheduling, Resource allocation, Multiple access, Power control, Malware detection, Cyber security, Flooding attacks detection, Mobile apps sniffing, MIMO detection, Signal detection in MIMO-OFDM, Modulation recognition, Channel Estimation, MIMO.

Important Dates

- Paper Submission: 28 February 2020
- Acceptance notification:02 April 2020
- Camera ready submission and registration: 15 April 2020

Link to the brochure . Reference for related works

- Machine Learning Paradigms for Next-Generation Wireless Networks
- Machine Learning for Wireless Communication Channel Modeling: An Overview
- CRAWDAD dataset
- UMass Trace Repository

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Quotes

"When learning is purposeful, creativity blossoms. When creativity blossoms, thinking emanates. When thinking emanates, knowledge is fully lit. When knowledge is lit, economy flourishes." — Dr. A.P.J.Abdul Kalam

On-going Research

- Investigating Regression techniques for solving the sunflower leaf segmentation problem
- Application of machine learning techniques in next generation wireless communication
- Classification of Music composition styles using probabilistic generative model
- Engine health monitoring using Machine learning, Deep learning and Computational intelligence
- Power allocation & Capacity maximization in NOMA using computational intelligence
- Millimeter wave channel estimation using computational Intelligence

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Feedback

COMPSIG NITT invites articles and innovative ideas from readers for the Reader's Space column. We expect feedback and comments to monthly newsletter COMPSIG NITT . Readers can share their views in our facebook page, COMPSIG-NITT. Those who are interested can be a part of the facebook group.

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