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.

Issue 3-12: December 2017

Team members

1. Dr. E.S.Gopi, Co-ordinator.
2. G. JayaBrindha, Ph.D. Scholar.
3. Neema. M, Ph.D. Scholar.
4. Rajasekharreddy Poreddy, Ph.D Scholar.
5. Vineetha Yogesh, M.Tech, Communication systems.
6. Shaik Mahammad, M.Tech, Communication systems.

Computational intelligence technique to estimate channel gain for efficient transmission policy of an Energy Harvesting Sensor

Internet of Things (IoT) and machine learning are getting much attention in recent years. They include household applications, Industrial applications, wireless sensors, etc. Enabling billions of devices in these applications requires continuous supply of energy for their uninterrupted functioning, which has led to the evolution of Energy Harvesting Sensors (EHS). EHS node harvest the energy from natural resources in small amounts that is stored in a battery and used instantaneously for all its needs. Hence, the Energy available at any instant of time will be very less in amount and the amount of energy harvesting in a frame time usually be either just sufficient for the transmission of current data or insufficient for transmission. This calls for the need to judiciously utilize the available Energy. This can be achieved by transmitting the data with just enough energy needed for successful and efficient transmission. Efficient transmission can be measured by the outage probability (fraction of unsuccessfully transmitted packets), it should be as low as possible. The optimum power for each packet is evaluated by estimating the channel gain at its time of transmission. A total of six techniques aiming at least outage probability and optimum power are proposed , two of them are based on Artificial Neural Network (ANN), Extreme Learning Machine (ELM) and rest four are based on a newly developed approach named as Maximum Matched Distribution (MMD) model. Performance of all these six techniques compared to the traditional transmission technique, without any computational intelligence (WoCI) can be observed in the Fig.1.

For further details contact: Mr. Shaik Mahammad,
mail id: mahammad.shaik2@gmail.com

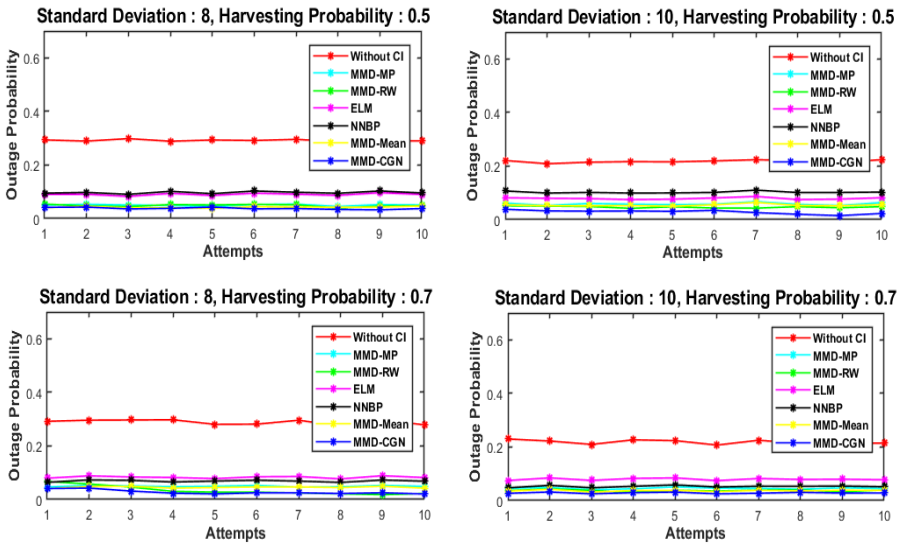

Fig.1: Performance of proposed techniques for different channel and energy harvesting conditions

Back to Contents

Estimation of Primary User Parameters in Cognitive Radio using Computational Intelligence

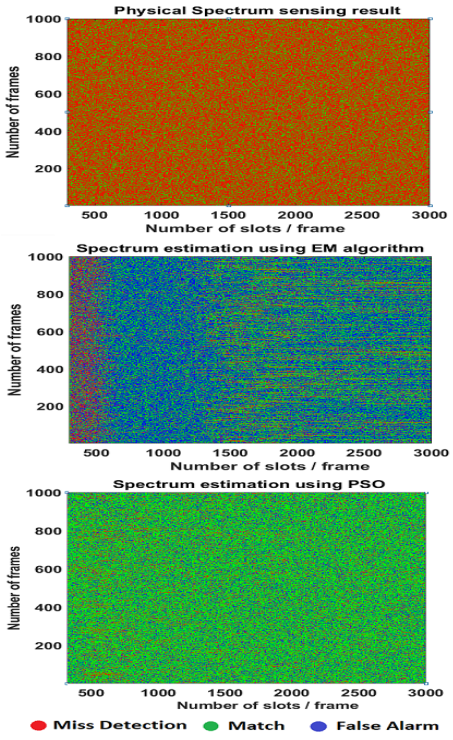

Fig.2

The spectrum estimation problem has evolved as the bottleneck problem for the development of the technologies due to the spectrum scarcity problem as well as congestion in the network due to a huge number of users. The CR is modeled as HMM with a set of HMM model parameters such the prior probability, transition probability and emission probability. An algorithm was proposed using the Computational Intelligence technology - **Particle Swarm Optimization (PSO)**, to estimate the HMM parameters in the cognitive radio network. Further to estimate the PU activity using the estimated HMM parameters, **Empirical match** algorithm was formulated which aims at minimizing the sum squared error, unlike the conventional Viterbi algorithm that aims at maximizing the generation probability of HMM model. The experiments were performed for a typical combination PU parameters using the conventional Expectation Maximization algorithm and the proposed algorithm - using PSO. The results of the experiment are illustrated as in fig 2. It can be observed that the result of implementation of PSO algorithm for parameter estimation followed by the Empirical match algorithm provides an improved match between the estimated sequence and the actual PU activity.

For further details contact: Ms. Vineetha Yogesh,
mail id: yogesh.vineetha25@gmail.com

Back to Contents

Back to Contents

On-going Research

- Constructing a Sunflower plant database and perform off-type identification using morphological features.
- Application of machine learning techniques in next generation wireless communication.
- Classification of Music composition styles using probabilistic generative model
- Computational intelligence for transmit power control policy of Energy Harvesting Sensors
- Estimation of Primary User Parameters in Cognitive Radio using Computational Intelligence

Back to Contents

Feedback

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

Back to Contents

Contact Information:
Pattern Recognition and Computational Intelligence Laboratory,
Department of Electronics and Communication Engineering,
National Institute of Technology Trichy - 620015
E-mail:esgopi@nitt.edu

Quotes

"Adversity always presents opportunities for introspection." — Dr. A.P.J.Abdul Kalam