Research Update as of Nov 2020

Ankit Bandyopadhyay

7th semester EE

GitHub id: Amdis23

Fast EMD !!

My Approach towards EMD

- It is a method to decompose a signal without leaving the time domain. It is comparable to fourier transform and decomposition method.
- Not very best for LTI Systems and majorly used in analysis for non-linear and non-stationery wave.
- What it does, it filters out functions which form a complete orthogonal basis for the original signal.
- Functions can be called a IMFs. And IMF can be used to describe the signal.

Research Potential

- If we can use EMD to fairly effectively determine the difference between a "fake" signal synthesized to look like natural data and a natural signal of the same type.
- In Grid Tied Inverters for Control, unfortunately the constraint should be under T=20 micro second.
- We can still use this for control operation for grid tied inverters. But emd, the old algorithm, is time consuming and there are traditional method we can use instead of that (Fourier transform).

* Analysis of old emd and new emd is available on GitHub

What is my approach to eliminate that?

- We figured that instead of taking mean (m) we can take the MAX (upper envelope ,lower envelope)(m*)
- And apply the basic emd X(t)-m*=h(t)
- h(t) gives us a pretty good result.
- Upon further analysis, we found out that there is a fundamental component in the error signal h(t) and we are facing difficulty removing that.
- One method if nothing works, like you suggested, is applying a band pass filte

*Algorithm pertaining to MAX has been uploaded to GitHub.

What I was thinking and Why the sudden halt

- The time complexity factor is of utmost importance if we have to stand out o(nlogn), we have to give priority to that
- Some machine learning or statistics tool(kNN) and SVM, so that we can make the whole algorithm more computationally efficient.
- We can make a separate algorithm which can act as a band pass filter and a neural network based on that so that it is less time consuming, if trained.
- This is the part, I believe, we are stuck.
- Finally, A hidden markov model based approach is initiated. (after studying 2 months of theory courses)

WILL RESUME WORK AFTER END SEMESTER EXAMS