

Project Outline

EMEC-5173: Intelligence Tools for Engineering Applications

Objective:

Develop a neuro-fuzzy (NF) system for engineering design applications. It can be used for system modeling (e.g., system state forecasting), pattern classification (e.g., diagnostics), or intelligent control. Appropriate learning algorithms should be implemented and applied to train both linear and nonlinear parameters.

Requirements:

- 1) PhD students should do the project individually.
- 2) MSc students can do the work with a group of TWO.
- 3) The NF system could have at least THREE inputs, and each input should have at least two membership functions.
- 4) Programming should be undertaken in MATLAB environment. The fuzzy reasoning and training should be programmed by your instead of using MATLAB toolboxes.
- 5) Hybrid training should be used for parameter optimization: The LSE could be used for linear parameter training and the gradient descent algorithm could be applied for nonlinear system parameter optimization.
- 6) The ANFIS toolbox in MATLAB can be used for performance comparison in terms of reasoning and training. The ANFIS model should have similar fuzzy reasoning and training algorithms.
- 7) It is recommended to use an error threshold of 10^{-5} and over 200 training epochs.

Project report:

- 1) Each group should provide one project report in PDF. The project report and MATLAB code can be submitted through D2L.
- 2) The report should contain sections such as Introduction, Theory Review, Model Construction, Result Analysis, Conclusion, and References.
- 3) The project report should use font size of 12 TNR or 11 Arial, 1.5 line space, and 1 inch page margins.
- 4) Report due: 1:00PM, Sunday, April 21