Fault Tolerant Data Processing

Neural Net based approach to:

- Enhance fault tolerance of neural net
- Deal with inaccurate input data
- Detect/Isolate inaccurate data
- Recover from inaccurate data

Classical Approach of Fault Tolerant Data Processing

Hardware Redundancy with Voting Schemes

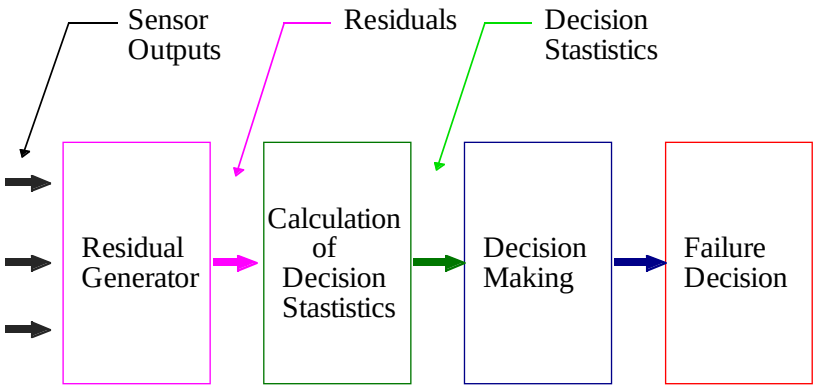
- Substantial Increase in Weight, Cost, and Space

Analytical Redundancy

- Model Based Approach
- Difficult to *define/solve* the model

Classical Approach

(Failure Detection / Isolation)



Neural Net Based Approach to Fault Tolerant Data Processing

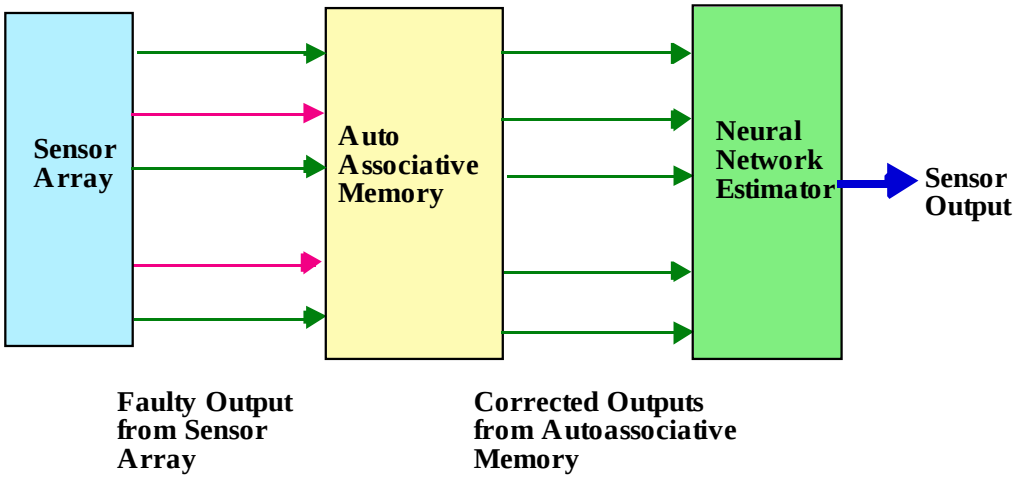
Model Based

- Learning from the Training Samples

Using Autoassociative Memory As Non-linear Principal Component Analysis (PCA)

- Correct for Noise, Distortion and Partial Inputs

Methodology of Sensor Failure / Degradation Recovery



Work to be done

- Use NN approach to process large sensor array
- Use Sensor Degradation/Failure Recovery in fault-tolerant environment
- Verify the weight adjustment techniques by simulation combined with AM
- Examine different NN architectures for fault tolerant systems, i.e., holographic, functional-link net, random vector enhanced, hybrid
- Do bench mark tests for various neural network architectures using real sensor data

Microelectromechanical Systems (MEMS)

ARO MURI Meeting, Cambridge, MA., October 1996 ·ve University