

This talk will have two parts. In the first part, we shall present a general scheme for dimensionality reduction via feature selection using a fuzzy rule-based system. This framework, can be used for designing fuzzy rule-based classifiers as well as fuzzy rule-based regression using either Takagi-Sugeno or Mamdani type models. It is an integrated approach where feature selection and system identification are done together. Then we shall talk about dimensionality reduction for data visualization. We shall present an unsupervised fuzzy rule-based dimensionality reduction method primarily for visualization. Typically, fuzzy rules are either provided by experts or extracted using an input-output training set. Here, neither the output data nor experts can provide the required rules. This, makes the problem challenging as we need to estimate the parameters of the rule base in such a manner that it can project the high-dimensional data into a lower dimensional (typically 2 or 3) preserving the neighborhood relation that is present in the high-dimensional data. We shall also demonstrate how this system can deal with out-of-sample data points and can reject test points, when it should. Due to the general nature of the framework, depending on the user's need, one can use different objective functions to obtain projections satisfying different goals.