# Project Summary for NSF NCSS I/UCRC – ASU SenSIP Site

**ASU-2019-10**

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| **Project Name:** | **Graph Filtering with Multiple Shift Matrices** |
| **Principal Investigator:** | Andreas Spanias (PI) Student: Jie Fan |

## Problem Statement:

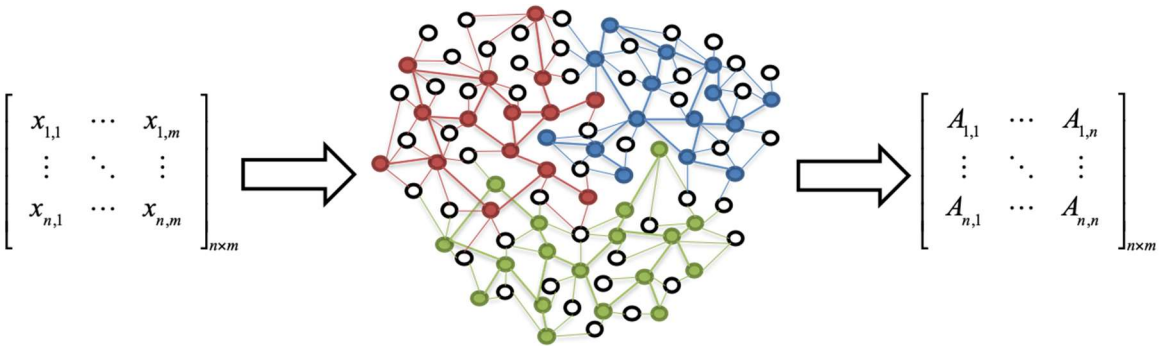
For datasets that reside on irregular and complex domains, using graph models to represent them can bring advantages. Graph signal processing ($DSP_G$) offers tools for such data sets and combines graph theory with traditional digital signal processing (DSP). In this project, we focus on improving the accuracy of graph-based classifier for semi-supervised classification. We propose an approach using multiple graph shift matrices, one for each feature, which provides better performance when the feature qualities are uneven. We study on multiple optimization solutions for the parameters of the model, which are graph filter coefficients and graph combing coefficients.

## Description:

Our first step is to generate graph shift matrices. We treat samples as graph nodes and calculate the similarities among feature values as edge weights. Then we optimize filter coefficients including graph filter taps and graph combing weights. At last, when the filter coefficients are well-trained, we use the graph to propagate label information from supervised samples to unsupervised samples.

**Latest Accomplishments**

- We developed a novel graph filter design method which adopt multiple graph shift matrices corresponding to different features.
- We developed different optimization solutions
- We implement our algorithm on multiple datasets, including synthetic and real data.




**Reference:**

**J. Fan**, et al, "Graph filtering with multiple graph shift matrices," *ICASSP*, 2019.

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