Project 1 (2017-2018)

Project Title: Using Fuzzy Extension Principle for Normalizing Fuzzy-Valued Weights

Adviser: Zhenyuan Wang

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Project's starting and ending dates: From the December 2017 to the end of June 2018.

Description: This project will develop an alternative method for normalizing fuzzy-valued weights that are used in aggregating received information in fuzzy environment. The classical extension principle can be generalized to the fuzzy extension principle such that it can deal with fuzzy-valued quantities. Regarding the operator of normalization as a function with multi-variables, the fuzzy extension principle can be adopted to normalize fuzzy-valued weights. Reducing fuzzy-valued weights to be interval weights will also be discussed.

Purpose: The student taking this project is required to study basic fuzzy set theory, spatially the decomposition theorem and the fuzzy extension principle, for starting the work. Through the work, the student should get a rigorous mathematics discipline including how to read mathematical references, to do research works, to write research papers, and to make presentations.

References:

[1] G. Klir and B.Yuan, *Fuzzy Sets and Fuzzy Logic: Theory and Applications*, Prentice Hall, 1995.
[2] O. Pavlacka, On various approaches to normalization of interval and fuzzy weights, *Fuzzy Sets and Systems* 243 (2014) 110-130.
[3] Y. Sui and Z. Wang, Discussion on normalization methods of interval weights, *Science Journal of Applied Mathematics and Statistics* 4(5) (2016) 249-252.
[4] Y. Sui, On normalization of fuzzy weights, supported by 2016-2017 Mini-Grant of Math Department, UNO.
[5] Z. Wang, R. Yang, and K.-S. Leung, *Nonlinear integrals and their Applications in Data Mining*, World Scientific, 2010.

Prerequisites: Math 1040, Math 2030, basic knowledge on fuzzy sets.

Requirements: Completing a research paper on this topic before the end of June, 2018. It may be submitted to some international conference or international journal.

Timetable:

December, 2017-February, 2018. Preparing the basic knowledge on fuzzy sets theory.

March-April, 2018. Developing a new normalization method by fuzzy extension principle for fuzzy-valued weights.

May, 2018. Completing a draft of the report as well as a research paper.

June, 2018. Revising the report and research paper to complete the project.