

Project 2 (2016-2017)

Project Title: On Normalization of Fuzzy Weights

Adviser: Zhenyuan Wang

Status: Yimeng Sui

Project's starting and ending dates: From the October 2016 to the end of June 2017.

Description: This is a succeeding work of “A discussion on normalization of interval weights”. As an aggregation tool in environment with uncertainty, the weighted average with fuzzy weights is often used. Generally, to convert a weighted sum to be a weighted average, the given weights should be normalized. In literature, some normalization methods for interval weights and fuzzy weights have been proposed. However, there is no suitable criterion to judge the goodness of these normalization methods. This project requires establishing a reasonable criterion and using it to judge existing normalization methods of fuzzy weights. Furthermore, introducing a new normalization method better than those is encouraged.

Purpose: The student taking this project is required to study basic fuzzy set theory 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] D.-Q. Li, J.-Y. Wang, and H.-X. Li, Note on “The normalization of interval and fuzzy weights”, *Fuzz Sets and Systems* 160 (2009) 2722-2725.
- [3] O. Pavlacka, On various approaches to normalization of interval and fuzzy weights, *Fuzzy Sets and Systems* 243 (2014) 110-130.
- [4] P. Sevastjanov, L. Dymova, and P. Bartosiewicz, A new approach to normalization of interval and fuzzy weights, *Fuzzy Sets and Systems* 198 (2012) 34-45.
- [5] Y. Sui and Z. Wang, A discussion on normalization methods of interval weights, *2016 International Conference on Applied Mathematics and Information Technology*, Jinan, China.

- [6] Y.-M. Wang and T. M.S. Elhag, On the normalization of interval and fuzzy weights, *Fuzzy Sets and Systems* 157 (2006) 2456-2471.
- [7] Z. Wang, R. Yang, and K.-S. Leung, *Nonlinear integrals and their Applications in Data Mining*, World Scientific, 2010.

Prerequisites: Math 1040, Math3000, MATH 8370/9110.

Requirements: Completing a research paper on this topic. It may be submitted to some international conference or international journal.

Timetable:

October, 2016-February, 2017. Preparing the basic knowledge on fuzzy sets theory.

March-April, 2017. Developing a new goodness criterion for normalization methods of fuzzy weights. Introducing a new normalization method for fuzzy weights.

May, 2017. Completing a draft of the report as well as a research paper.

June, 2017. Revising the report and research paper to complete the project.