



Aalto-yliopisto
Perustieteiden
korkeakoulu

A Study on Decision Making Using Fuzzy Decision Trees

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Työn saa tallentaa ja julkistaa Aalto-yliopiston avoimilla verkkosivuilla. Muilta osin kaikki oikeudet pidätetään.

Background

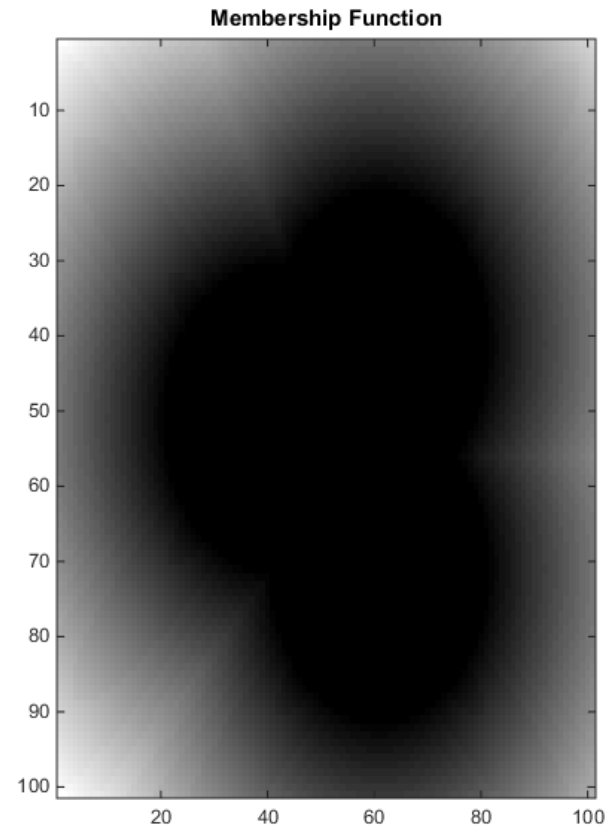
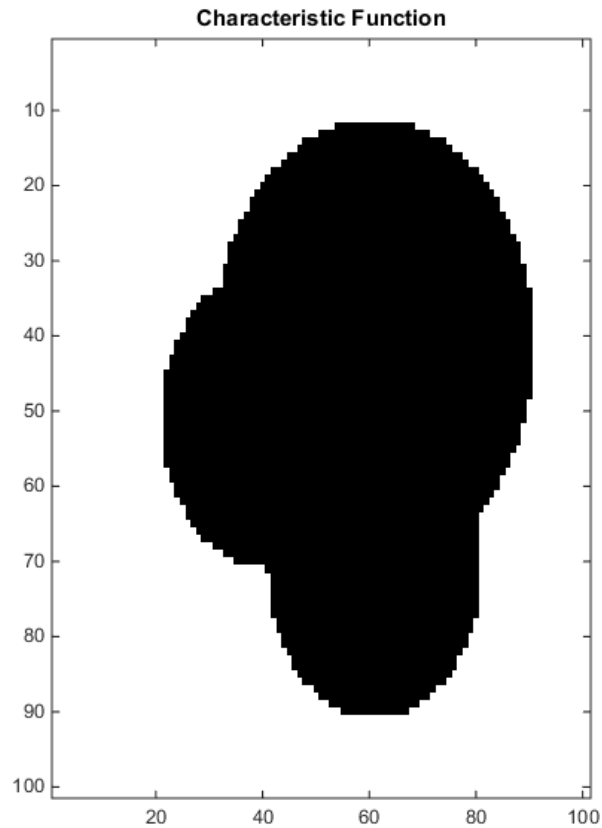
- Precise representation of scenarios in decision making might not adequately represent imprecision
- Fuzzy set theory useful in reasoning about vague quantities
- Specifically study fuzzy extensions to decision trees

Characteristic and membership functions

- Fuzzy set theory often viewed as an extension of classical (crisp) set theory
- Membership function as an extension of the characteristic function

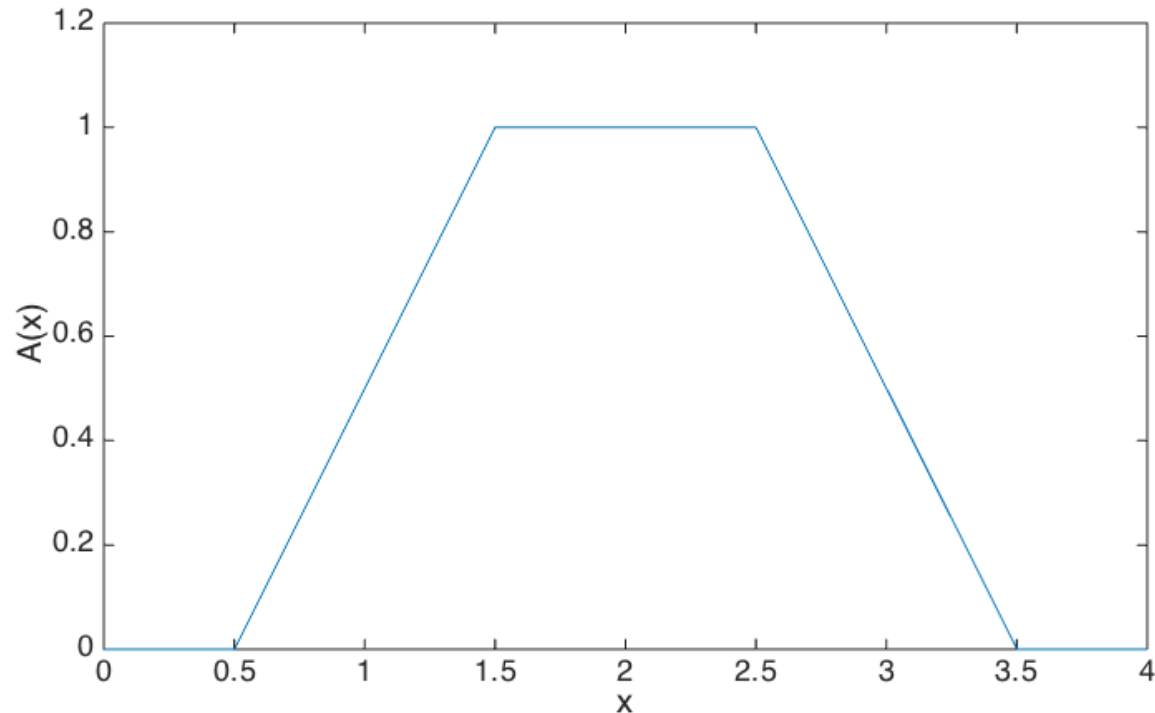
Characteristic function	$A: X \rightarrow \{0,1\}$
Membership function	$A: X \rightarrow [0,1]$

Crisp and Fuzzy sets



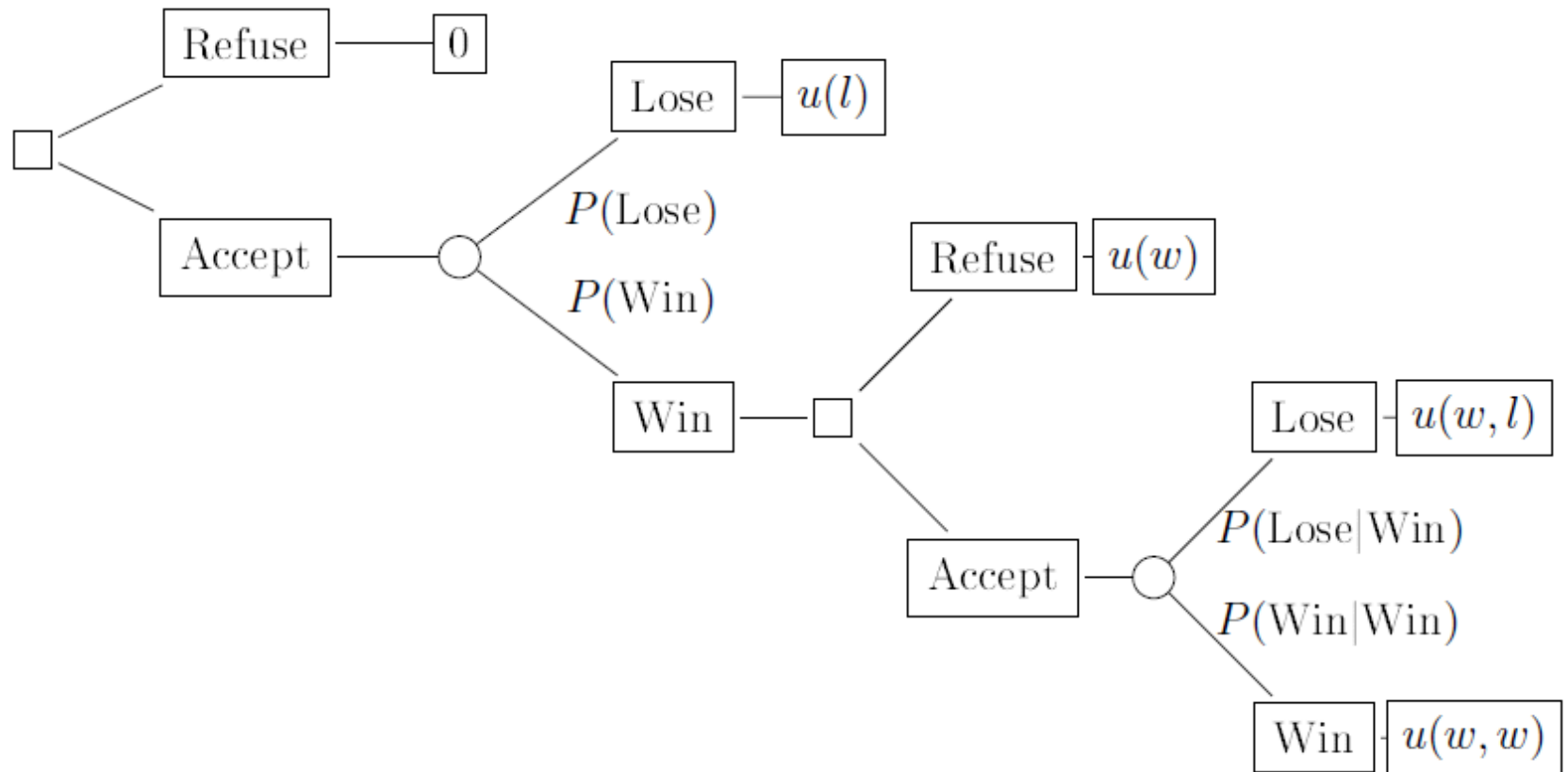
Fuzzy Numbers

- Special case of a Fuzzy Set with $A : \mathbb{R} \rightarrow [0,1]$



A fuzzy number representing a quantity “approximately in [1.5, 2.5]”

Decision Trees



Objectives of the Thesis

- Study extensions of decision trees using fuzzy arithmetics
- Examine methods to capture imprecision in estimated quantities
- Consider formation of fuzzy decision rules

Literature

- G. Klir and B. Yuan. *Fuzzy Sets and Fuzzy Logic*, volume 4. Prentice Hall New Jersey, 1995.
- D. Dubois and H. Prade. Operations on fuzzy numbers. *International Journal of Systems Science*, 9(6):613626, 1978.
- S. Watson, J. Weiss and M. Donnell. Fuzzy Decision Analysis. *IEEE Transactions on Systems, Man and Cybernetics*, vol.9, no.1, pp.1,9, 1979

Schedule

- Literary Review and Study 12/2014-1/2015
- Preliminary Definitions 1/2015
- Introduction of Topic 23.2.2015
- Write Thesis 3/2015-4/2015
- Presentation of Thesis 20.4.2015