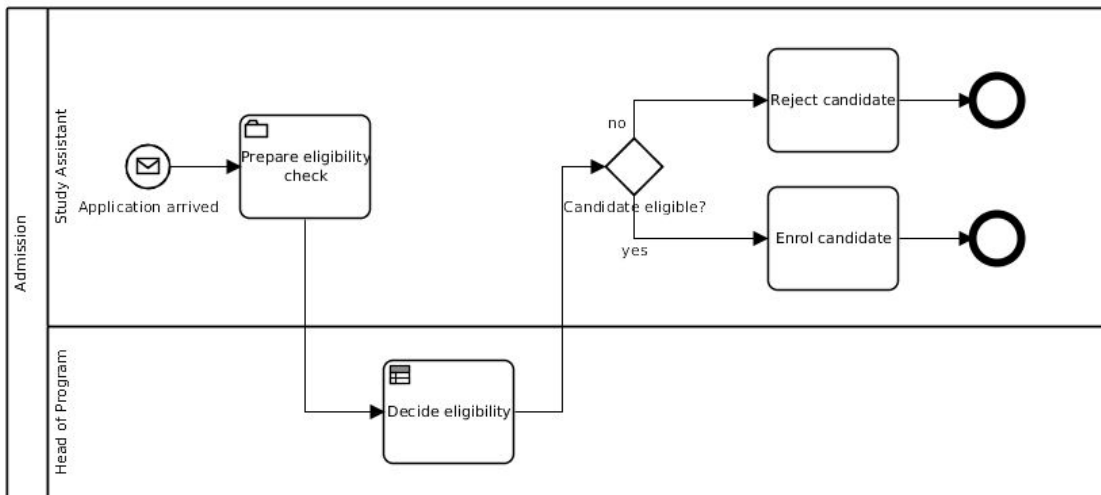


Exercise: Decisions in the Admission Process

This is a simplified model of the admission process to the Msc Business Information Systems.



The process starts when we receive the application from a candidate.

First the study assistant prepares the eligibility check of the candidate. The study assistant makes sure that all information is available to assess eligibility, in particular information about the university, the grading system and the profession. As a result of this activity the assistant fills a candidate profile form:

Candidate Profile

Name: _____

Bachelor Degree in: Information Systems
 Computer Science
 Business Administration
 other

Average Grade: _____

Months of professional experience: _____

Then head of program decides the eligibility:

The eligibility of a is calculated with the help of an eligibility score (1 .. 10). A high eligibility score is 7 or higher; not high is 5. A low score is until 5; 7 is definitely not low anymore.

The eligibility score is high if candidates have a bachelor degree in Information Systems, Computer Science or Business Administration with at least a good average grade and reasonable professional experience. A good grade is definitely above 5.0¹. A grade with 4.5 (or lower) is definitely not a good grade. Professional experience above or equal 1 year is good, but experience below 6 months is not reasonable anymore.

Candidates are eligible if their eligibility score (1 .. 10) is higher or equal than 5.

Exercise

Decide eligibility with fuzzy rules.

Decide it for Sir Tim Berners-Lee, who has a bachelor's degree in computer science with the (Swiss) grade 5.5 and a professional experience of 9 Month.

¹ The Swiss grading system goes from 1.0 (lowest grade) to 6.0 (highest grade). You pass, if you have 4.0 (or higher).

Definition of the Fuzzy Logic System

Specify Input and Output variables

Input:

- Bachelor degree: *Information Systems, Computer Science or Business Administration*
- *Grade: 1 .. 6*
- *Experience: Months*

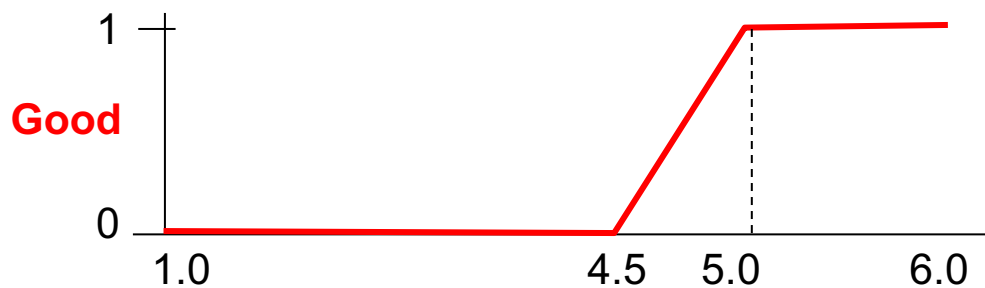
Output:

- *eligibility score: 1 .. 10*

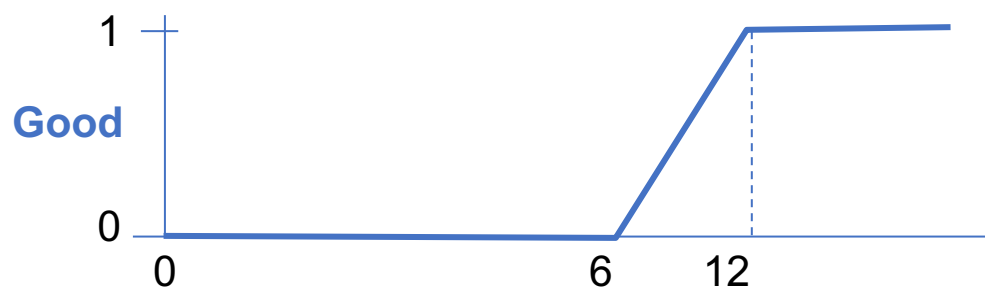
Fuzzification of variables and values

Input:

- Bachelor degree: *Information Systems, Computer Science or Business Administration*
IS FUZZIFIED ALREADY
- *Grade: 1 .. 6*
 - *Good: 5.0 .. 6.0; not Good: 1 .. 4.5*

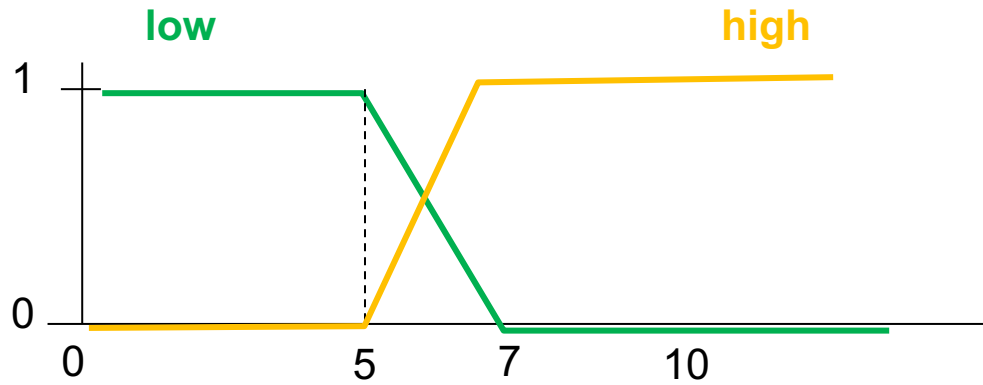


- *Experience: Months*
 - *Good: 12 month ..; not Good: 0 .. 6*



Output:

- *eligibility score: 1 .. 10*
 - *high: 7 .. 10; not high: 0 .. 5*
 - *low: 0 .. 5; not low: 7 .. 10*



Define fuzzy rules

The following rules are clear:

- A. IF Bachelor degree = Information Systems AND Grade = good AND Experience = good
THEN Eligibility Score = high
- B. IF Bachelor degree = Computer Science AND Grade = good AND Experience = good
THEN Eligibility Score = high
- C. IF Bachelor degree = Business Administration AND Grade = good AND Experience = good
THEN Eligibility Score = high

The following rules are needed to have “counterweight”

- D. IF NOT(Grade = good)
THEN Eligibility Score = low
- E. IF NOT(Experience = good)
THEN Eligibility Score = low

Choose defuzzification method

Centre of Gravity

Application of Fuzzy Logic System

Application for the example candidate: Sir Tim Berners Lee

- Degree: Computer Science
- Grade: 5.5 $\rightarrow \mu_{\text{Grade}}(5.5) = 1$
- Experience: 9 Month $\rightarrow \mu_{\text{Experience}}(9) = 0.5$ (9 is in the middle between 6 and 12; therefore $\mu_{\text{Experience}}$ should also be in the middle)

Application of the Rules

- Rule A: $\mu_{\text{Score=high}} = 0$
- Rule B: $\mu_{\text{Score=high}} = \text{alpha cut at } \min(1, 0.5) = 0.5$
- Rule C: $\mu_{\text{Score=high}} = 0$
- Rule D: $\mu_{\text{Score=low}} = 0$
- Rule E: $\mu_{\text{Score=low}} = \text{alpha cut at } 0.5$

Aggregating the Rule Results

- Centre of Gravity = (5, 0.25) because the shapes of Rule B and E are combined to a rectangle (10 * 0.5)
- Result: 5 (just the x value of the centre of gravity)