5. Linguistic Variables

Remark 5.1

Common language based process descriptions often contain no precise values. Instead imprecise values are used. Examples are descriptions of routes or medical reports.

Def. 5.2

A linguistic variable is a tupel (N,U,G,M),where

N   Name of the linguistic variable

G   Formal grammar

L(G) consists of values of linguistic variables

M   Set of semantic rules, which assign to each $x \in L(G)$
       its meaning M(x), $M(x):U \rightarrow [0,1]$

U   Basic set

Example 5.3

N: age, U: $\Re$

Syntax: The language of "age" is defined by G:

basic term: about (i), older than (i), ... $i \in \Re$

basic term: young, old

term: basic term|(term and term)|very (term)| (term or term)

L(G): language generated by G

Semantic: To each basic term x a fuzzy set M(x) is assigned. The composite terms are evaluated by using fuzzy operations.

x and y $\rightarrow$ $M(x) \wedge M(y)$

x or y $\rightarrow$ $M(x) \vee M(y)$

very (x) $\rightarrow$ $M^2(x)$

Computing with Words

Task: Linguistic
Description

→ linguistic modeling

Fuzzy
Description

Solution: Linguistic
Description

← linguistic approximation

Solution with
Fuzzy Methods