

1. Introduction

Example 1.1

How many grains of sand has a sand dune at least?

Let $d_n = T(A_n)$ denote the “degree of acceptance” for the statement “ n grains of sand are a sand dune”.

$$0 = d_0 \leq d_1 \leq \dots \leq d_n \leq \dots \leq 1$$

can be seen as the truth values of a many valued logic.

Example 1.2

Statement $A(n)$: “Hans ate n eggs at breakfast”.

- (Subjective) Probability $P(A(n))$ can be determined by experiments.
- Possibility $\Pi(A(n))$: “How many eggs can Hans ate at for breakfast?”

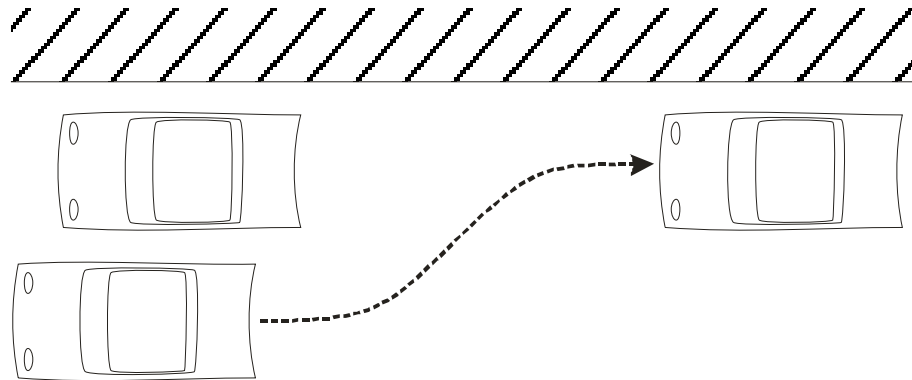
n	1	2	3	4	5	6	7	8
$\Pi(A(n))$	1	1	1	1	0.8	0.6	0.4	0.2
$P(A(n))$	0.1	0.8	0.1	0	0	0	0	0

Result:

- A possible event has not to be probable.
- A probable event is always possible.

Example 1.3

Driving a car back into a parking space.



Questions:

- What is the meaning of satisfactory parking?
- Demand on precision?
- Realisation of control?

Example 1.4

Granularity of a system: (e.g. an auditorium)

- System components: window, ceiling, board,...
- Parts of components: window frame,...
- Material: wood,...
- Molecule
- Atom

⇒ In general statements are imprecise w.r.t. refined levels.

⇒ Imprecise (fuzzy-)statements take this imprecision into account.

Remark 1.5: L.A. Zadehs principle of incompatibility

“Stated informally, the essence of this principle is that as the complexity of a system increases, our ability to make precise and yet significant statements about its behaviour diminishes until a threshold is reached beyond which precision and significance (or relevance) become almost mutually exclusive characteristics.”

⇒ Fuzzy sets/fuzzy logic are used as a mechanism for abstraction of unnecessary or too complex details.

Remark 1.6: Distinction between fuzziness and uncertainty

Fuzziness:

- Today the weather is fine
- Imprecise defined concepts
- Neglect of details
- Computing with words

Uncertainty:

- How is the exchange rate of the dollar tomorrow?
- Probability, possibility

Remark 1.7

Applications of Fuzzy Systems

- Control
- Reasoning
- Data analysis
- Image analysis

Advantages

- Use of imprecise information
- Use of expert knowledge
- Robust not linear control
- Time to market
- Marketing aspects

Japanese Trademarks



登録：ローのニューロ&ファジィ
表示：これに類似する商標を付記

“Neuro & Fuzzy”

Sanyo



登録：ファジィのファジー表示 通常、
下部に類似する商標が記される

“Fuzzy”

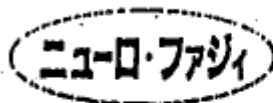
Mitsubishi



登録：ファジィのファジー表示
ファジー商品のマーク

“Fuzzy”

Toshiba



登録：ニューロ・ファジィのニューロ・ファ
ジィ商品に表示されるマーク

“Neuro & Fuzzy”

Matsushita



登録：ニューロ・ファジィ商品
の大半に表示されているマーク

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NEURO & FUZZY
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