In this paper the author discusses Fuzzy or non-Fuzzy, the best defined management is fuzzy, i.e. it is better to use in governing a human centered system not the conventional mathematical apparatus (specially when the mathematical apparatus leads to extremely large computational efforts) but the apparatus of fuzzy sets and algorithms.

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Introduction

By human centered system the author means a system with human beings as elements able to make decision and to communicate one with other in a given field of activity e.g. economic, political, legal, religious systems, etc. The author wants to govern this system in order to achieve some goal, fuzzy or non-fuzzy.

The main result obtained is Fuzzy or non-Fuzzy, the best defined management is fuzzy, i.e. it is better to use in governing a human centered system; not the conventional mathematical apparatus (especially when the mathematical apparatus leads to extremely large computational efforts) but the apparatus of fuzzy sets and algorithms.

At the centre of our considerations is the existence of notion (ideas) which are fuzzy in any individual of the human centered system; this the author is able to exploit if we govern fuzzy but sacrifice precision but again significance (Zadeh’s principle)\(^1,6\).

Fuzzy Instruction:

Fuzzy governing is considered as a sequence of fuzzy instructions applied to a human centered system in order to improve its behaviors (or functioning) with respect to some goals set by the system or its governing body.

Let \( S \) be a set of instructions given to the human centered system \( H \). An instructions \( S \) is called fuzzy with respect to the individual \( h_i \) if in response to \( s \), \( h_i \) generated a fuzzy set

\[
F_i = \sum_{j \in J} \mu_i(X_j)/X_j
\]

(1)

Where \( x X \) is a alternatives generated by the individuals in \( H \) the alternatives may be Instructions or actions related to the meaning of \( s \); \( J \) is a finite index set with more than 1 element and denotes a union of fuzzy singletons \( \mu_i(X_j) \) rather than an arithmetic sum: \( \mu_i(X_j) \) is grade of membership of \( x_i \) to \( F_j \) (membership function or compatibility function) and associates with each its compatibility with the meaning of \( s \).

The fuzzy set \( F_j \) expresses a way of understanding \( s \) by \( h_i \); equation (1) may be written in the following ways :
**Interesting Book on Cybernetics**

where \( \tilde{x}_1 = \) to buy an interesting book on pattern recognition

\( \tilde{x}_2 = \) to buy an easy for understanding book on artificial intelligence

\( \tilde{x}_3 = \) "to buy “Cybernetics” by N. Wiener" and hi understands the meaning of fuzzy instructions \( x_1 \) and \( x_2 \) as follows

\( \tilde{x}_1 = 0.7/ x_{11} + 0.6/ x_{12} \)

\( \tilde{x}_2 = 0.8/ x_{21} + 0.9/ x_{22} \)

The support of \( F \) is defined as follows:

\[
\text{supp } F_i = \{ 1, 2, 3, 4, 5 \}
\]

A measure of similarity in ways of understanding given fuzzy instructions by the individuals hi and hk is expressed as

\[
d(F_i, F_k) = \frac{1}{m + \sum_{j=1}^{m} \min \{ \mu_i(x_j), \mu_k(x_j) \}}
\]

where \( X' = \text{supp } F_1 \cap \text{supp } F_2 \mid x_j \in X \mid j = 1, \ldots, m. \)

In the example 1, \( d(F_1, F_2) = 0.86 \)

We say that \( F \) coincide \( F_1 \) if \( d(F_1, F_2) \geq \epsilon \)

where \( \epsilon < 0 \) is some preliminary assigned threshold value.

### Insertion Trees:

Now let us define an important operation “insertion” which has a meaning of concretizing the ways of understanding fuzzy instructions (or clarification of ideas of notions)\(^3\).

Let \( h_1, h_2 \subseteq S \) and \( F_i = \sum_{j=1}^{m} \mu_i(x_j)/ x_j \) be a fuzzy instruction. If \( X_{j_0} = \sum_{k=0}^{m-1} \mu_i(x_k)/ x_k \) then “insertion” means building the fuzzy set

\[
F_i = \sum_{j \in J/\{j_0\}} \mu_i(x_j) + \sum_{k \in J} \min \{ \mu_i(x_{j_0}), \mu_i(x_k) \}/ x_k
\]

**Example 2.** Let \( s = \text{BUY MODERN AND INTERESTING BOOK ON CYBERNETICS} \)
chain); $A_k$ is called a minimal element. A fuzzy instruction $s$ is called feasible for $h_i$ if its insertion tree is Artin’s in the order defined above with a non-fuzzy minimal element.

The insertion tree of a feasible instruction may be infinite. For example, the tree given on the fig. 2

With $A_i^{(k)}$ we denote the $k$th level of the insertion tree. We say that $h_i$ and $h_k$ understand $s$ in the same way if there exist integers $p$ and $p’ (p,p’ \geq 1)$ so that $A_i^{(p)} \subseteq A_i^{(p’)}$.

Coalitions:

We introduce a threshold value $\delta$ so that if two individuals understand a given fuzzy instruction in the same way they form a coalition.

We suppose:

After the instruction is given, coalitions are formed because of the communication among the individuals in $H$.

$H = k_1 \cup k_2 \cup \ldots \cup k_n \cup \{k\}$ where if $h_i, h_j \in k_1$ then $h_i$ and $h_j$ understand the given fuzzy instruction in the same way; $\{k\}$ is set of “hesitating” elements.

Three conditions imply existence of main group (nucleus) of individuals playing a role of “dictators of particular type”:

i. Fuzziness of the instruction.

ii. Communication among the individuals

iii. Outside necessity for decision making (or optimization of some utility function)

This result follows from a general principle of nucleus extracted from Arrow’s well-known theorem, from the experiments of Gause in biology and form a series of other results and experiments in psychology, sociology and physics (Pavlov, Pauli).

Without losing the generality of the basic idea we state the principle of nucleus oriented to human centered system as follows:

In every human centered system there is a group of leaders. The group of leaders includes mainly individuals who are most erudite in the field of activity in which the human centered system operates.

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