Fuzzy Set Theory

wu

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1 Fuzzy sets-basic definitions

If X is a collection of objects denoted generically by x, then a **fuzzy set** $\tilde{A}$ in X is a set of ordered pairs

$$\tilde{A} = \{(x, \mu_{\tilde{A}}(x)) | x \in X\}$$

$\mu_{\tilde{A}}(x)$ is called the **membership function** or **grade of membership** of x in $\tilde{A}$ that maps X to the membership space M

The **support** of a fuzzy set $\tilde{A}$, $S(\tilde{A})$ i sthe crisp set of all $x \in X$ s.t. $\mu_{\tilde{A}}(x) > 0$

The (crisp) set of elements that belong to the fuzzy set $\tilde{A}$ at least to the degree α is called the **α-level set**

$$A_\alpha = \{x \in X | \mu_{\tilde{A}}(x) \geqslant \alpha\}$$