wang1992generating Wang-Mendel —— Wang-Mendel [?, ?] $X_{tr} = \{x_1, x_2, \ldots, x_i, \ldots, x_{N_{tr}}\}$ $Y_{tr} = \{y_1, y_2, \ldots, y_i, \ldots, y_{N_{tr}}\}$ $F = \{f_1, f_2, \ldots, f_j, \ldots, f_{N_f}\}$ X_{tr} N_{tr} N_f $\forall x_{i,j} \in X_{tr}$ x_i f_j $A = \{a_{j,k} | j = 1, 2, \ldots, N_f; k = 1, 2, \ldots, N_{fs}\}$ $B = \{b_{j,k} | j = 1, 2, \ldots, N_f; k = 1, 2, \ldots, N_{fs}\}$ A N_{fs} $\forall f_j \in F$ f_j B $H = \{h_1, h_2, \ldots, h_j, \ldots, h_{N_f}\}$ $\forall h_j \in H$ 3.1 Wang-Mendel equation.3.1.1

$$h_j = \frac{f_j^{max} - f_j^{min}}{N_{fs} - 1} \tag{1}$$

$f_j^{min} = \min_{x_i \in X_{tr}} \{x_{i,j}\}$ $f_j^{max} = \max_{x_i \in X_{tr}} \{x_{i,j}\}$ $\forall b_{j,k} \in B$ 3.2 Wang-Mendel equation.3.1.2 $b_{j,k}$ 3.1 $N_{fs} = 5$ f_j figure.caption.7 f_j $N_{fs} = 5$

$$b_{j,k} = \begin{cases} f_j^{min} & if \quad k = 1 \\ f_j^{min} + (j-1)h_j & if \quad 1 < k < N_{fs} \\ f_j^{max} & if \quad k = N_{fs} \end{cases} \tag{2}$$

[width = 0.9]Fig$_1$.*pdf*N$_{fs} = 5$ f_j Illustrative example of Membership function defined on f_j when $N_{fs} = 5$

Wang-Mendel $\forall x_i \in X_{tr}$ r_i r$_i$: **IF** $\underbrace{x_{i,1}\, is\, a_{1,\kappa_i^1} \wedge \cdots \wedge x_{i,j}\, is\, a_{j,\kappa_i^j} \wedge \cdots \wedge x_{i,N_f}\, is\, a_{N_f,\kappa_i^{N_f}}}_{antecedent}$ **THEN** $\underbrace{x_i\, belongsto\, y_i \,\text{with}\, w_i.}_{consequent}$ $x_{i,j}$ x_i f_j a_{j,κ_i^j} f_j r_i w_i x_i y_i κ_i^j 3.4 Wang-Mendel equation.3.1.4

$$\kappa_i^j = \arg \max_{k \in [1, N_{fs}]} \{\mu_{a_{j,k}}(x_{i,j})\} \tag{3}$$

3.5 Wang-Mendel equation.3.1.5

$$w_i = \prod_{j=1}^{N_f} \mu_{a_{j,\kappa_i^j}}(x_{i,j}) \tag{4}$$

3.4 Wang-Mendel equation.3.1.4 3.5 Wang-Mendel equation.3.1.5 $\mu_{a_{j,k}}(x_{i,j})$ 3.6 Wang-Mendel equation.3.1.6 - 3.8 Wang-Mendel equation.3.1.8

$$\mu_{a_{j,k}}(x_{i,j}) = \begin{cases} 1 & if \quad x_{i,j} < f_j^{min} \\ (f_j^{min} - x_{i,j} + h_j)/h_j & if \quad f_j^{min} x_{i,j} < f_j^{min} + h_j \quad (k = 1) \\ 0 & if \quad x f_j^{min} + h_j \end{cases} \tag{5}$$

$$\mu_{a_{j,k}}(x_{i,j}) = \begin{cases} 0 & if \quad x_{i,j} < f_j^{min} + (k-2)h_j or x_{i,j} > f_j^{min} + kh_j \\ (x_{i,j} - f_j^{min} - (k-2)h_j)/h_j & if \quad x_{i,j} f_j^{min} + (k-2)h_j and x < f_j^{min} + (k-1)h_j \quad (1 < k < N_f) \\ (-x_{i,j} + f_j^{min} + kh_j)/h_j & if \quad x_{i,j} f_j^{min} + (k-1)h_j and x_{i,j} f_j^{min} + kh_j \end{cases} \tag{6}$$

$$\mu_{a_{j,k}}(x_{i,j}) = \begin{cases} 0 & if \quad x_{i,j} < f_j^{max} - h_j \\ (-f_j^{max} + x_{i,j} + h_j)/h_j & if \quad x_{i,j} f_j^{max} - h_j and x_{i,j} f_j^{max} \quad (k = N_f) \\ 1 & if \quad x_{i,j} f_j^{max} \end{cases} \tag{7}$$

$R = \{r_1, r_2, \ldots, r_i, \ldots, r_{N_{tr}}\}$ R [?, ?, ?, ?] R $\bar{R}$ $\hat{X}_{ts} = \{\hat{x}_1, \hat{x}_2, \ldots, \hat{x}_i, \ldots, \hat{x}_{N_{ts}}\}$ $\forall \hat{x}_i \in \hat{X}_{ts}$ $\hat{x}_i$ 3.3 Wang-Mendel equation.3.1.3 $\hat{r}_i$ $\bar{R}$ $\hat{x}_i$ 3.3 Wang-Mendel equation.3.1.3 Wang-Mendel Wang-Mendel

Cell Relationships between cells and fuzzy sets

$2^* f_1$	f_2				
	$a_{2,1}$	$a_{2,2}$	$a_{2,3}$	$a_{2,4}$	$a_{2,5}$
$a_{1,1}$	s_1	s_2	s_3	s_4	s_5
$a_{1,2}$	s_6	s_7	s_8	s_9	s_{10}
$a_{1,3}$	s_{11}	s_{12}	s_{13}	s_{14}	s_{15}
$a_{1,4}$	s_{16}	s_{17}	s_{18}	s_{19}	s_{20}
$a_{1,5}$	s_{21}	s_{22}	s_{23}	s_{24}	s_{25}

$f_j \in F$ cell 3.2 $N_f = 2$ $N_{fs} = 5$ Cell figure.caption.10 $N_f = 2$ $N_{fs} = 5$ cell cell $\prod_{j=1}^{N_f} N_{fs} = 25$ 3.1Cell table.caption.9 cell $S = \{s_1, s_2, \ldots, s_t, \ldots, s_{N_s}\}$ cell $\forall s_t \in S$ s_t S

[width = 0.9]Fig$_2$.*pdf*N$_f = 2$ $N_{fs} = 5$ Cell Illustrative example of cells

1 Wang-Mendel