1.1

[?, ?, ?] “ ” “ ”

$X_{tr} = \{x_1, x_2, \ldots, x_i, \ldots, x_{N_{tr}}\}$ $F = \{f_1, f_2, \ldots, f_j, \ldots, f_{N_f}\}$ N_{tr} N_f $\forall x_{i,j} \in X_{tr}$ $x_{i,j}$ x_i f_j $A = \{a_{j,k} | j = 1, 2, \ldots, N_f; k = 1, 2, \ldots, N_{fs}\}$ F N_{fs} N_{fs} $B = \{b_{j,k} | j = 1, 2, \ldots, N_f; k = 1, 2, \ldots, N_{fs}\}$ $D = \{d_{j,k} | j = 1, 2, \ldots, N_f; k = 1, 2, \ldots, N_{fs}\}$ A x_i $a_{j,k}$ 4.1 equation.4.1.

$$\mu_{a_{j,k}}(x_i) = \exp\left(-\frac{(x_{i,j} - b_{j,k})^2}{2d_{j,k}^2}\right) \tag{1}$$

$\forall x_i \in X_{tr}$ $f_j \in F$ $x_{i,j}$ N_{fs} $A_j = \{a_{j,1}, a_{j,2}, \ldots, a_{j,k}, \ldots, a_{j,N_{fs}}\} \subset A$ B_j D_j A_j N_f N_{fs} jang1993anfis $x_{i,j}$

$$\mathcal{F}_{\mathcal{B}_j,\mathcal{D}_j}(x_{i,j}) = \exp\left(-\frac{(x_{i,j} - \mathcal{B}_j)^2}{2\mathcal{D}_j^2}\right) \tag{2}$$

4.2 equation.4.1.2 $x_{i,j}$ $\forall x_{i,j} \in x_i$, $x_{i,j}$ A_j

1.2

4.2 equation.4.1.2 $\otimes$ $R = \{r_1, r_2, \ldots, r_t, \ldots, r_{N_s}\}$ N_s $N_s = \prod_{j=1}^{N_f} N_{fs}$

$$\mathcal{W}_i = \mathcal{F}_1(x_{i,1}) \otimes \mathcal{F}_2(x_{i,2}) \otimes \ldots \otimes \mathcal{F}_{N_f}(x_{i,N_f}) \tag{3}$$

$\mathcal{W}_i = (w_{i,1}, w_{i,2}, \ldots, w_{i,t}, \ldots, w_{i,N_s})$ $\forall w_{i,t} \in \mathcal{W}_i$ x_i r_t $\forall r_t \in R$, r_t

$$\mathrm{r}_t : \textbf{IF } \underbrace{x_{i,1}\, is\, a_{1,k_t^1} \wedge \ldots \wedge x_{i,j}\, is\, a_{j,k_t^j} \wedge \ldots \wedge x_{i,N_f}\, is\, a_{N_f,k_t^{N_f}}}_{antecedent}$$

$$\textbf{THEN } \underbrace{\begin{cases} x_i\, belongsto\, c_1\, with\, p_{t,1}. \\ \ldots \\ x_i\, belongsto\, c_l\, with\, p_{t,l}. \\ \ldots \\ x_i\, belongsto\, c_{N_c}\, with\, p_{t,N_c}. \end{cases}}_{consequent}$$

$k_t = (k_t^1, k_t^2, \ldots, k_t^j, \ldots, k_t^{N_f})$ r_t $t = 1 + \sum_{j=1}^{N_f}(k_t^j - 1)(N_{fs})^{j-1}$ $C = \{c_1, c_2, \ldots, c_l, \ldots, c_{N_c}\}$ $p_t = (p_{t,1}, p_{t,2}, \ldots, p_{t,l}, \ldots, p_{t,N_c})$ N_c

[width = 0.9]local$_e$*xpert.pdf*

Figure 1: $N_f = 2$ $N_{fs} = 2$ $N_c = 3$

1.3

4.4 equation.4.1.4 p_t r_t p_t $\mathcal{Q} = \{q_{t,l} | t = 1, 2, \ldots, N_s; l = 1, 2, \ldots, N_c\}$ R - R x_i

$$p_i = \mathcal{G}(\mathcal{W}_i, \mathcal{Q}) = \sum_{t=1}^{N_s} w_{i,t} q_t \tag{4}$$

$p_i = (p_{i,1}, p_{i,2}, \ldots, p_{i,l}, \ldots, p_{i,N_c})$ R 4.1 $N_f = 2$ $N_{fs} = 2$ $N_c = 3$ figure.caption.28 $N_f = 2$ $N_{fs} = 2$ $N_c = 3$

2

[width = 1]global$_s$*tructure.pdf*

Figure 2: $N_f = 5$ $N_{fc} = 2$ $N_{fle} = 3$ $N_c = 2$

Jacobs1991adaptive MOE [?, ?, ?, ?] AMFSGNN 4.2 $N_f = 5$ $N_{fc} = 2$ $N_{fle} = 3$ $N_c = 2$ figure.caption.29

4.2 $N_f = 5$ $N_{fc} = 2$ $N_{fle} = 3$ $N_c = 2$ figure.caption.29 AMFSGNN $x_i \in X_{tr}$ $\Psi_i = \{\psi_{i,1}, \psi_{i,2}, \ldots, \psi_{i,d}, \ldots, \psi_{i,N_{fle}}\}$ N_{fle} $\forall \psi_{i,d} \in \Psi_i$, $\psi_{i,d} = \{x_{i,h_1^d}, x_{i,h_2^d}, \ldots, x_{i,h_n^d}, \ldots, x_{i,h_{N_{fc}}^d}\}$ $h^d = (h_1^d, h_2^d, \ldots, h_n^d, \ldots, h_{N_{fc}}^d)$ $\psi_{i,d}$ N_{fc} $\forall \psi_{i,d} \in \Psi$ $N_{fle} = \lceil N_f / N_{fc} \rceil$ 4.1 section.4.1 $FLE_1, FLE_2, \ldots, FLE_d, \ldots, FLE_{N_{fle}}$

$$p_i^d = FLE_d(\psi_{i,d}) \tag{5}$$

$p_i^d = (p_{i,1}^d, p_{i,2}^d, \ldots, p_{i,l}^d, \ldots, p_{i,N_c}^d)$ FLE_d $\phi = \{p_i^1, p_i^2, \ldots, p_i^d, \ldots, p_i^{N_{fle}}\}$ 5 $N_{fc} = 2$ $N_{fle} = 3$ $N_c = 2$ figure.caption.29 ReLU N_o x_i $\Theta_i =$

1