Parametric Family Parameter Generation $(\mathcal{N}_\Theta)$
$X_{t,i} = [\mathbf{x}_{t-\delta+1,i}, \cdots, \mathbf{x}_{t,i}] \in \mathbb{R}^{d\times\delta}$
Input Covariate Matrix
(δ Lag Observations)
$\theta_{t,i} \in \mathbb{R}^p$
Parameter
RNN
RNN
RNN
Parameter $\theta_{t,i}$
Batch Normalization
Consider time-dynamics of covariates by time-lagged observations
....
Covariate Vector
$\mathbf{x}_{t-\delta+1,i}$
$\mathbf{x}_{t,i}$
Parametric Family Determination $(\mathcal{N}_\mathcal{F})$
MLP
$y_{t,i}[3+1]$
$y_{t,i}[3]$
$y_{t,i}[2]$
$y_{t,i}[1]$
$\hat{F}_{t,i}(\tau_{3+1})$
$\hat{F}_{t,i}(\tau_3)$
$\hat{F}_{t,i}(\tau_2)$
$\hat{F}_{t,i}(\tau_1)$
Softmax
Add
τ_k
Prediction Horizon
Cumulative Default Probability
$\hat{F}_{t,i}(\tau_k)$
τ_1 τ_2 τ_3 τ_{3+1}
Objective Function
$\mathcal{L} = \sum_{t\in\mathcal{T}} \sum_{i=1}^{n_t} \sum_{k=1}^{m+1} \mathrm{CrossEntropy}(\hat{F}_{t,i}(\tau_k), H_{t,i}(\tau_k))$
Ground Truth Function
$H_{t,i}(\tau_k)$
τ_1 τ_2 τ_3 τ_{3+1}