# **Methods Notations**

We denote a multivariate time series with \( D \) variables of length \( T \) as \( X = (x\_1, x\_2, \ldots, x\_T)^T \in \mathbb{R}^{T imes D} \), where for each \( t \in \{1, 2, \ldots, T\} \), \( x\_t \in \mathbb{R}^D \) represents the \( t \)-th observations (a.k.a., measurements) of all variables and \( x\_t^d \) denotes the measurement of \( d \)-th variable of \( x\_t \). Let \( s\_t \in \mathbb{R} \) denote the timestamp when the \( t \)-th observation is obtained and we assume that the first observation is made at timestamp 0 (i.e., \( s\_1 = 0 \)). A time series \( X \) could have missing values. We introduce a masking vector \( m\_t \in \{0, 1\}^D \) to denote which variables are missing at time step \( t \), and also maintain the time interval \( \delta\_t^d \in \mathbb{R} \) for each variable \( d \) since its last observation. To be more specific, we have

m\_t^d =   
 { 1, if x\_t^d is observed  
 { 0, otherwise

δ\_t^d =   
 { s\_t - s\_{t-1} + δ\_{t-1}^d, t > 1, m\_{t-1}^d = 0  
 { s\_t - s\_{t-1}, t > 1, m\_{t-1}^d = 1  
 { 0, t = 1