Title: Reconstruction of time series using pruning via sampling

Problem: For a given set of time series, one has to make a dynamic graph, prune it, and reconstruct the initial time series (according to MSE or another convenient criterion).

Data: Any time series (example in Varenik 2022)

References: Masters Thesis Varenik 2022, Discrete Graph Structure Learning for Forecasting Multiple Time Series 2021

Base solution: implementation of method without pruning loss

Proposed solution: add density loss, i.e. $| \| A \|_1 - p | \to \min_A$

Novelty: ability to control binary adjacency matrix to prune graphs

$$\min_w \mathbb{E}_{A \sim Ber(\theta(w))} \left[L(A, w, X) + L_{prune}(A, p) \right]$$

Parametize A s.t. $A_{ij} \sim Ber(\theta_{ij}(w))$, where

$\theta_{ij} = f(z_i \| z_j ; w)$ – success prob. of Bernoulli distribution,

$f: \mathbb{R}^{2k} \to \mathbb{R}$

$z_i = g(X_i ; \varphi)$ – feature extracted from i^{th} time series

$g: \mathbb{R}^{t \times d} \to \mathbb{R}^k$