Algorithm 2: Model selection

Input: *data train:* $\mathbf{P}^{\text{Train}} \in \mathbb{R}^d \otimes \mathbb{R}^{T^{\text{Train}}}$,
data test: $\mathbf{P}^{\text{Test}} \in \mathbb{R}^d \otimes R^{T^{\text{Test}}}$,
number of atoms: $K \in \mathbb{N}_0$,
lambda: $\lambda \geq 0$

Output: *reconstruction error:* $\mathcal{E}$

$\mathbf{D}^{\text{Train}}, \mathbf{A}^{\text{Train}}, \mathbf{w}^{\text{Train}} \leftarrow DL(\mathbf{P}^{\text{Train}}, K, \lambda, 500)$

$\mathbf{A}^{\text{Test}} \leftarrow \text{Proj}_{\mathbf{D}^{\text{Train}}}\left(\mathbf{P}^{\text{Test}}\right)$

$A_{k,t}^{\text{Sim}} \leftarrow \widehat{\mu}_k + A_{k,t}^{\text{Test}} w_k^{\text{Train}} + \varepsilon_k^t$ with

$$\widehat{\mu}_k = \bar{\alpha}_k^{\text{Train}}(1 - w_k^{\text{Train}}),$$
$$\varepsilon_k^t \sim \mathcal{N}\left(0, \widehat{\sigma}_k^2\right),$$
$$\widehat{\sigma}_k^2 \leftarrow \widehat{\text{Var}}[\boldsymbol{\alpha}_k^{\text{Train}}]\left(1 - (w_k^{\text{Train}})^2\right),$$

for all $k = 1, \ldots, K$ and $t = 1, \ldots, T^{\text{Test}} - 1$

$\mathbf{P}^{\text{Sim}} \leftarrow \mathbf{D}^{\text{Train}} \mathbf{A}^{\text{Sim}}$

$\mathcal{E} \leftarrow \left\| \mathbf{P}_{:,1:}^{\text{Test}} - \mathbf{P}^{\text{Sim}} \right\|_F^2$ # without the first test value