Algorithm 4: Supervised learning cut level algorithm

input : Training set $\mathbf{T} = \mathbf{Z}_{S1}^{train}$ and test set $\mathbf{U} = \mathbf{Z}_{S1}^{test}$
output: Matrix $\tilde{\mathbf{X}}^{(s^*)}$ of aggregated-SNP at best cut level s^*

hierarchy $\leftarrow$ Constrained-HAC on $\mathbf{T}$
cutlevel $\leftarrow$ Initialize levels where to cut hierarchy
for $s \leftarrow$ `Sequence(cutlevel)` **do**
    $\tilde{\mathbf{T}}^s \leftarrow$ `Aggregating(`$\mathbf{T}$, hierarchy, cutlevel$[s]$`)`;
    $\tilde{\mathbf{U}}^s \leftarrow$ `Aggregating(`$\mathbf{U}$, hierarchy, cutlevel$[s]$`)`;
    ridgecoef $\leftarrow$ `RidgeRegression(`$\mathbf{y}_{S1}^{train} \sim \tilde{\mathbf{T}}$`)`;
    $\mathbf{y}_{S1}^{pred} \leftarrow$ `Predict(`$\tilde{\mathbf{U}}$,ridgecoef`)`;
    AUC$[s] \leftarrow$ `ROC(`$\mathbf{y}_{S1}^{test}, \mathbf{y}_{S1}^{pred}$`)`;
end
$s^* \leftarrow$ `Which(`cutlevel, `Max(`AUC`))`;
$\tilde{\mathbf{X}}^{(s^*)} \leftarrow$ `Aggregating(`$\mathbf{Z}$, hierarchy, bestlevel`)`;