

Generating polynomials for the data sketches of arbitrarily correlated classifiers

Two classifier ensembles

$$\begin{aligned} \text{generatingSet2Classifiers} = \{ & -f_{\alpha,\alpha} + P_{\alpha} (P_{i,\alpha,\alpha} P_{j,\alpha,\alpha} + \Gamma_{i,j,\alpha}) + P_{\beta} (P_{i,\alpha,\beta} P_{j,\alpha,\beta} + \Gamma_{i,j,\beta}), \\ & -f_{\alpha,\beta} + P_{\alpha} (P_{i,\alpha,\alpha} P_{j,\beta,\alpha} - \Gamma_{i,j,\alpha}) + P_{\beta} (P_{i,\alpha,\beta} P_{j,\beta,\beta} - \Gamma_{i,j,\beta}), \\ & -f_{\beta,\alpha} + P_{\alpha} (P_{i,\beta,\alpha} P_{j,\alpha,\alpha} - \Gamma_{i,j,\alpha}) + P_{\beta} (P_{i,\beta,\beta} P_{j,\alpha,\beta} - \Gamma_{i,j,\beta}), \\ & -f_{\beta,\beta} + P_{\alpha} (P_{i,\beta,\alpha} P_{j,\beta,\alpha} + \Gamma_{i,j,\alpha}) + P_{\beta} (P_{i,\beta,\beta} P_{j,\beta,\beta} + \Gamma_{i,j,\beta}) \} \end{aligned}$$

Three classifier ensembles

$$\begin{aligned} \text{generatingSet3Classifiers} = \\ \{ & -f_{\alpha,\alpha,\alpha} + P_{\alpha} (P_{i,\alpha,\alpha} P_{j,\alpha,\alpha} P_{k,\alpha,\alpha} + P_{k,\alpha,\alpha} \Gamma_{i,j,\alpha} + P_{j,\alpha,\alpha} \Gamma_{i,k,\alpha} + P_{i,\alpha,\alpha} \Gamma_{j,k,\alpha} + \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\alpha,\beta} P_{j,\alpha,\beta} P_{k,\alpha,\beta} + P_{k,\alpha,\beta} \Gamma_{i,j,\beta} + P_{j,\alpha,\beta} \Gamma_{i,k,\beta} + P_{i,\alpha,\beta} \Gamma_{j,k,\beta} - \Gamma_{i,j,k,\beta}), \\ & -f_{\alpha,\alpha,\beta} + P_{\alpha} (P_{i,\alpha,\alpha} P_{j,\alpha,\alpha} P_{k,\beta,\alpha} + P_{k,\beta,\alpha} \Gamma_{i,j,\alpha} - P_{j,\alpha,\alpha} \Gamma_{i,k,\alpha} - P_{i,\alpha,\alpha} \Gamma_{j,k,\alpha} - \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\alpha,\beta} P_{j,\alpha,\beta} P_{k,\beta,\beta} + P_{k,\beta,\beta} \Gamma_{i,j,\beta} - P_{j,\alpha,\beta} \Gamma_{i,k,\beta} - P_{i,\alpha,\beta} \Gamma_{j,k,\beta} + \Gamma_{i,j,k,\beta}), \\ & -f_{\alpha,\beta,\alpha} + P_{\alpha} (P_{i,\alpha,\alpha} P_{j,\beta,\alpha} P_{k,\alpha,\alpha} - P_{k,\alpha,\alpha} \Gamma_{i,j,\alpha} + P_{j,\beta,\alpha} \Gamma_{i,k,\alpha} - P_{i,\alpha,\alpha} \Gamma_{j,k,\alpha} - \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\alpha,\beta} P_{j,\beta,\beta} P_{k,\alpha,\beta} - P_{k,\alpha,\beta} \Gamma_{i,j,\beta} + P_{j,\beta,\beta} \Gamma_{i,k,\beta} - P_{i,\alpha,\beta} \Gamma_{j,k,\beta} + \Gamma_{i,j,k,\beta}), \\ & -f_{\alpha,\beta,\beta} + P_{\alpha} (P_{i,\alpha,\alpha} P_{j,\beta,\alpha} P_{k,\beta,\alpha} - P_{k,\beta,\alpha} \Gamma_{i,j,\alpha} - P_{j,\beta,\alpha} \Gamma_{i,k,\alpha} + P_{i,\alpha,\alpha} \Gamma_{j,k,\alpha} + \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\alpha,\beta} P_{j,\beta,\beta} P_{k,\beta,\beta} - P_{k,\beta,\beta} \Gamma_{i,j,\beta} - P_{j,\beta,\beta} \Gamma_{i,k,\beta} + P_{i,\alpha,\beta} \Gamma_{j,k,\beta} - \Gamma_{i,j,k,\beta}), \\ & -f_{\beta,\alpha,\alpha} + P_{\alpha} (P_{i,\beta,\alpha} P_{j,\alpha,\alpha} P_{k,\alpha,\alpha} - P_{k,\alpha,\alpha} \Gamma_{i,j,\alpha} - P_{j,\alpha,\alpha} \Gamma_{i,k,\alpha} + P_{i,\beta,\alpha} \Gamma_{j,k,\alpha} - \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\beta,\beta} P_{j,\alpha,\beta} P_{k,\alpha,\beta} - P_{k,\alpha,\beta} \Gamma_{i,j,\beta} - P_{j,\alpha,\beta} \Gamma_{i,k,\beta} + P_{i,\beta,\beta} \Gamma_{j,k,\beta} + \Gamma_{i,j,k,\beta}), \\ & -f_{\beta,\alpha,\beta} + P_{\alpha} (P_{i,\beta,\alpha} P_{j,\alpha,\alpha} P_{k,\beta,\alpha} - P_{k,\beta,\alpha} \Gamma_{i,j,\alpha} + P_{j,\alpha,\alpha} \Gamma_{i,k,\alpha} - P_{i,\beta,\alpha} \Gamma_{j,k,\alpha} + \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\beta,\beta} P_{j,\alpha,\beta} P_{k,\beta,\beta} - P_{k,\beta,\beta} \Gamma_{i,j,\beta} + P_{j,\alpha,\beta} \Gamma_{i,k,\beta} - P_{i,\beta,\beta} \Gamma_{j,k,\beta} - \Gamma_{i,j,k,\beta}), \\ & -f_{\beta,\beta,\alpha} + P_{\alpha} (P_{i,\beta,\alpha} P_{j,\beta,\alpha} P_{k,\alpha,\alpha} + P_{k,\alpha,\alpha} \Gamma_{i,j,\alpha} - P_{j,\beta,\alpha} \Gamma_{i,k,\alpha} - P_{i,\beta,\alpha} \Gamma_{j,k,\alpha} + \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\beta,\beta} P_{j,\beta,\beta} P_{k,\alpha,\beta} + P_{k,\alpha,\beta} \Gamma_{i,j,\beta} - P_{j,\beta,\beta} \Gamma_{i,k,\beta} - P_{i,\beta,\beta} \Gamma_{j,k,\beta} - \Gamma_{i,j,k,\beta}), \\ & -f_{\beta,\beta,\beta} + P_{\alpha} (P_{i,\beta,\alpha} P_{j,\beta,\alpha} P_{k,\beta,\alpha} + P_{k,\beta,\alpha} \Gamma_{i,j,\alpha} + P_{j,\beta,\alpha} \Gamma_{i,k,\alpha} + P_{i,\beta,\alpha} \Gamma_{j,k,\alpha} - \Gamma_{i,j,k,\alpha}) + \\ & P_{\beta} (P_{i,\beta,\beta} P_{j,\beta,\beta} P_{k,\beta,\beta} + P_{k,\beta,\beta} \Gamma_{i,j,\beta} + P_{j,\beta,\beta} \Gamma_{i,k,\beta} + P_{i,\beta,\beta} \Gamma_{j,k,\beta} + \Gamma_{i,j,k,\beta}) \} \end{aligned}$$