CS 8725: Equations in Supervised Learning final project

Classifiers Comparison for Gender Identification from Facial Images

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SVM	Training	Test
Gaussian RBF	89.32%	**87.37%**
Polynomial [3]	**89.68%**	86.48%
Linear	82.34%	81.67%
K-NN [9]	82.34%	77.76%
Naive Bayes	77.10%	76.16%

Boosting	$SVM^{guassian}$	$SVM^{polynomial}$	K-NN	NB
1	87.37%	86.30%	**77.76%**	76.16%
2	84.88%	87.01%	77.76%	76.16%
3	86.48%	86.65%	77.76%	78.11%
4	84.52%	**87.90%**	77.76%	77.94%
5	85.94%	87.19%	77.76%	78.29%
6	85.77%	86.65%	77.76%	78.29%
7	84.88%	86.65%	77.76%	**79%**
8	85.94%	86.12%	77.76%	79%
9	86.30%	86.65%	77.76%	79%
10	86.65%	86.65%	77.76%	79%
11	86.48%	86.83%	77.76%	79%
12	86.30%	85.94%	77.76%	79%
13	87.01%	86.30%	77.76%	79%
14	87.01%	86.30%	77.76%	79%
15	87.19%	86.48%	77.76%	79%
16	**87.54%**	86.48%	77.76%	79%

$$G(x_i, x_j) = e^{-||x_i - x_j||^2} \tag{1}$$

$$G(x_i, x_j) = x_i^T x_j \tag{2}$$

$$G(x_i, x_j) = (1 + x_i^T x_j)^p \tag{3}$$

$$x_i \leftarrow \frac{x_i}{\sigma} \quad \forall i \tag{4}$$

$$K(x'^{(i)}, x'^{(j)}) = e^{-\frac{||x^{(i)} - x^{(j)}||^2}{\sigma^2}} \tag{5}$$

$$\alpha_t = \frac{1}{2} \ln \left(\frac{1 - \epsilon_t}{\epsilon_t} \right) \tag{6}$$

$$D_{t+1}(i) = \frac{D_t(i)}{2} \begin{cases} 1/(1 - \epsilon_t) & \text{Correct} \\ 1/\epsilon_t & \text{Wrong} \end{cases} \tag{7}$$

$$\epsilon_t = \sum_{i \in Wrong} D_t(i) \tag{8}$$

$$u_{ij} = \frac{\exp(-\beta d(x_i, \theta_j))}{\sum_{k=1}^{c} \exp(-\beta d(x_i, \theta_k))} \tag{9}$$

$$\theta_j = \{x_k \in X - \Theta | \operatorname*{argmin}_k \sum_{i=1}^{N} u_{ij}^q d(x_i, x_k)\} \tag{10}$$