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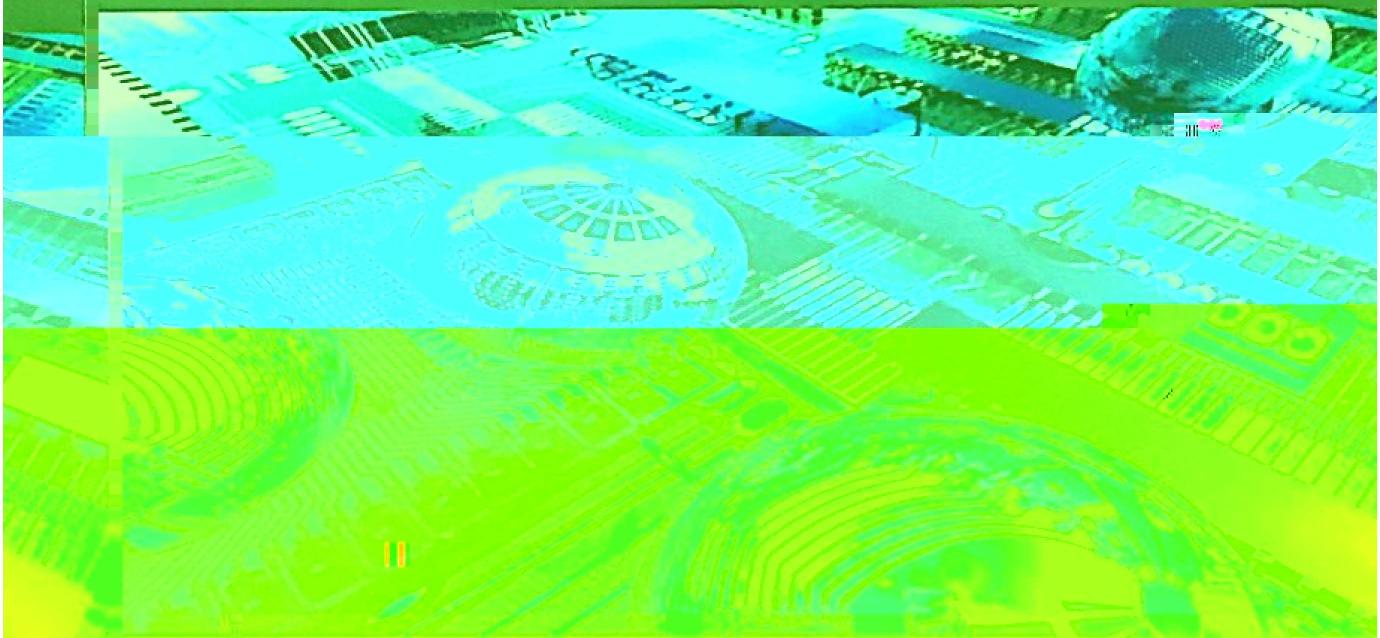

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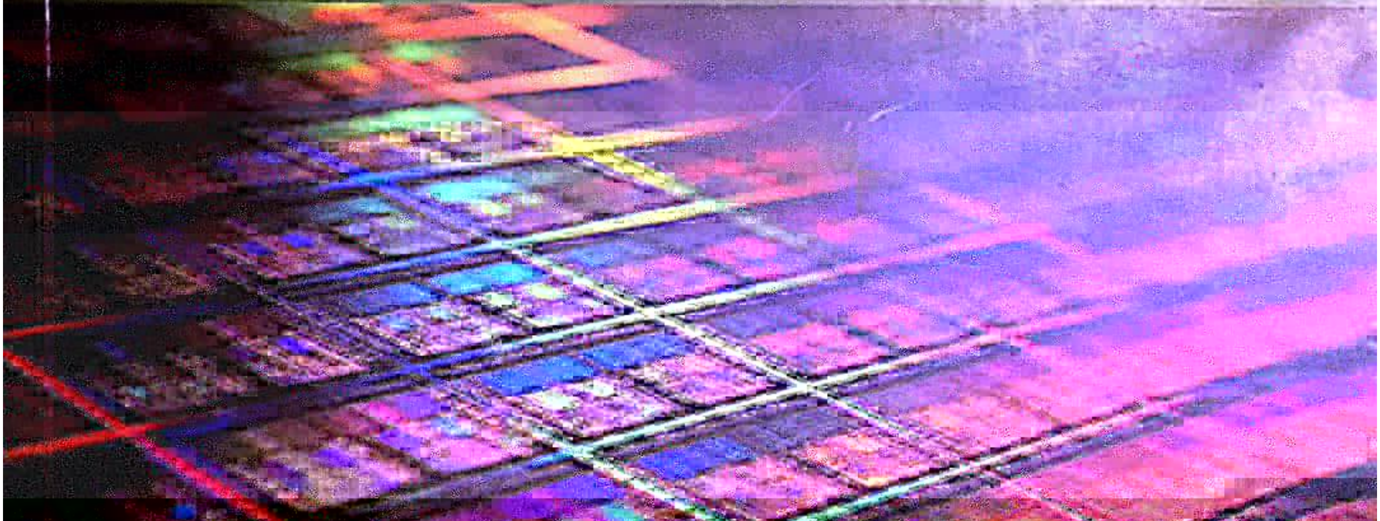

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$x_i \quad R^n, i \quad 1,\ldots,l$ $\qquad y \quad R^l \qquad y \quad \{1, \quad 1\}$

$$\min_{w,b,} \frac{1}{2} w^T w \quad C \sum_{i\ 1}^{l} \quad {}_i$$
$$subject\ to \quad y_i(w^T \quad (x_i) \quad b) \quad 1 \quad {}_i$$
$${}_i \quad 0, i \quad 1,\ldots,l$$

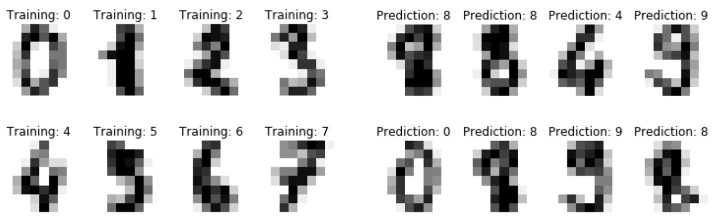
$$\min \frac{1}{2} \quad {}^T Q \quad e^T$$
$$subject\ to \quad y^T \quad 0$$
$$0 \quad C, i \quad 1,\ldots,l$$

e $\qquad C \quad 0$ $\qquad Q \quad n \quad n$

$$k(x,z) \quad (x^T z \quad c)^d$$

$$k(x,z) \quad \exp(\quad | x \quad z |^2)$$

$$k(x,z) \quad \frac{1}{1 \quad \exp(v x^T \quad c)}$$



The training data examples (left) and forecast data examples (right)

forecast result is show in

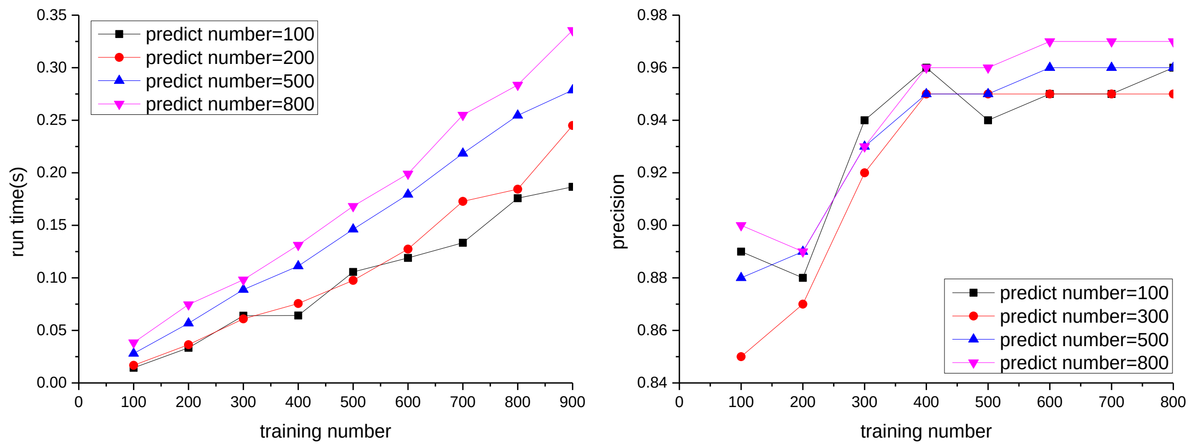


Figure 3. The relation of training number between run time (left) and precision (right)

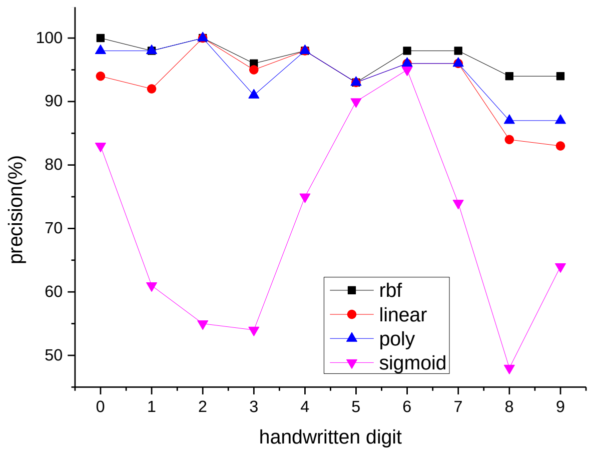


Figure 4. The precisions between different kernel functions

The setting of initial parameters is very important, and the parameters directly affect the generalization ability of SVM. It is necessary to select suitable parameters to train SVC models through tests.

When training an SVM with the RBF kernel, C and gamma is considered. The recognition rate increases continuously with C increases. When C increases to a certain extent, the recognition rate changes little, the maximum accuracy is 0.97. The recognition rate increases first with gamma increases, and when gamma increases to a certain value (about 0.001-0.002), precision begins to decline (fig. 5).

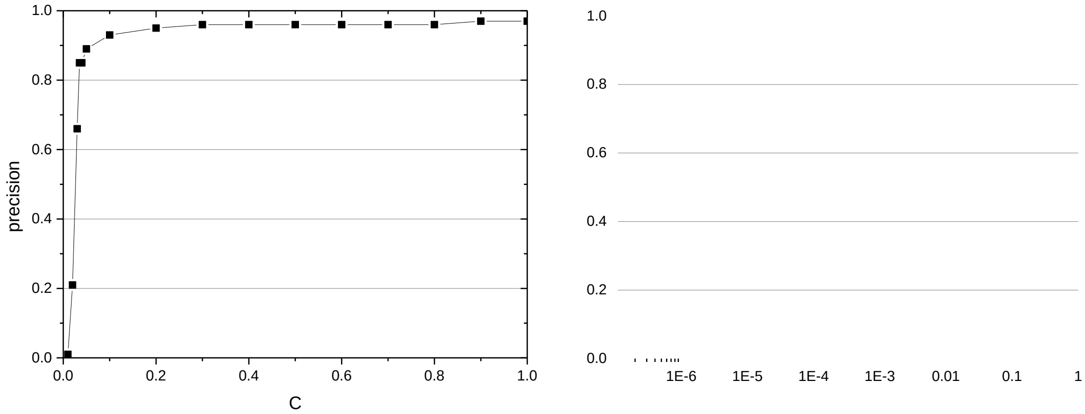


Figure 5. The relationship between C (left),gamma(right) and recognition precision

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