实验设计

实验目的

验证利用LRR所得矩阵Z进行已知数据分类和新数据检测的可行性

2018.5.31

实验设置

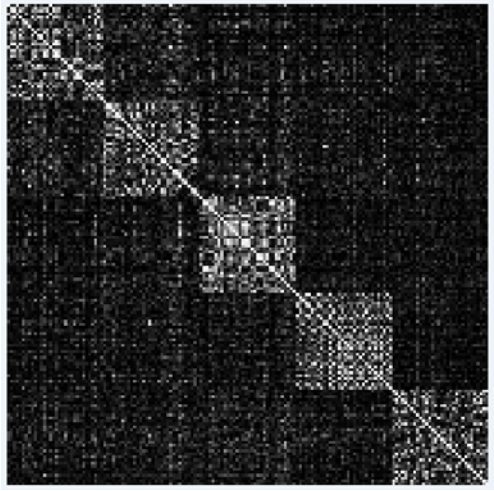
The Extended Yale Face Database B

38类（人），每类64张图片。取前五类（每类32张，共计160张）为训练数据。

测试时，选取前五类剩余的一半（32*5=160）和6-10类图片160张（每类32张）。

160*5

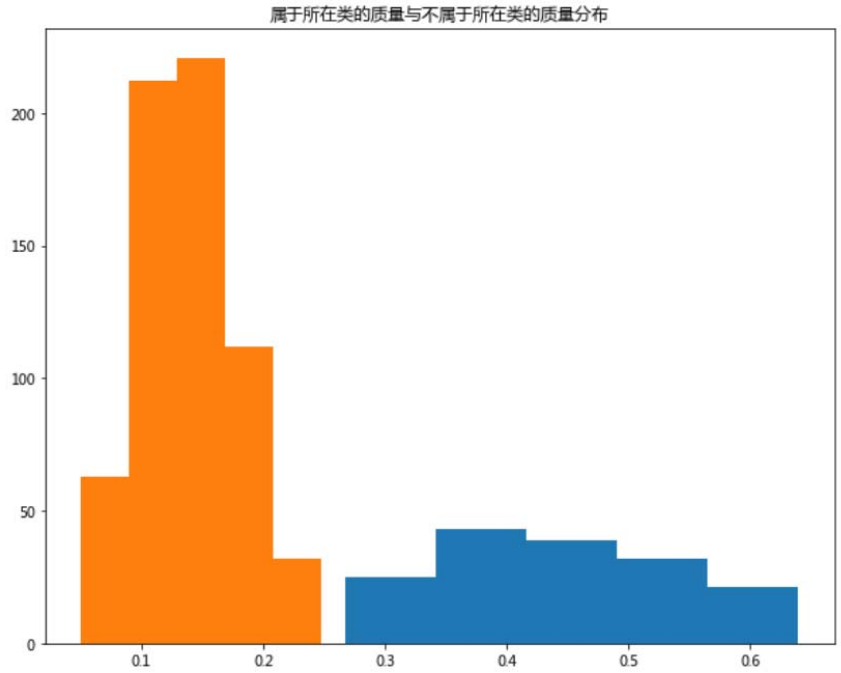
161*5

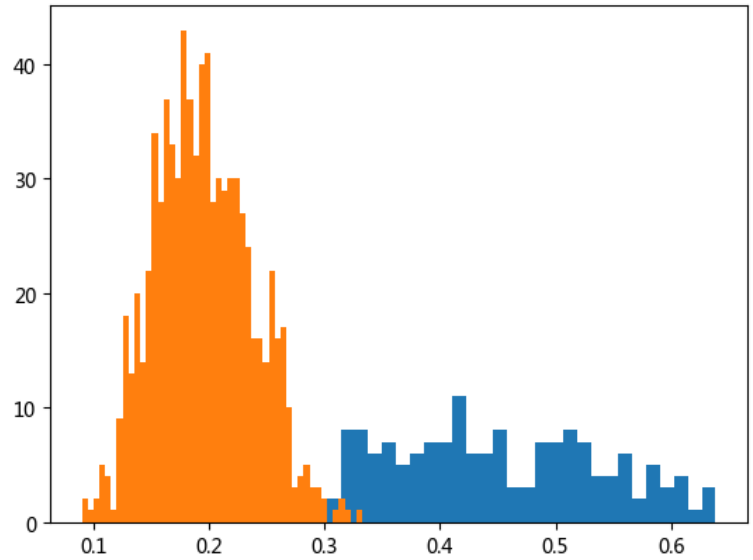


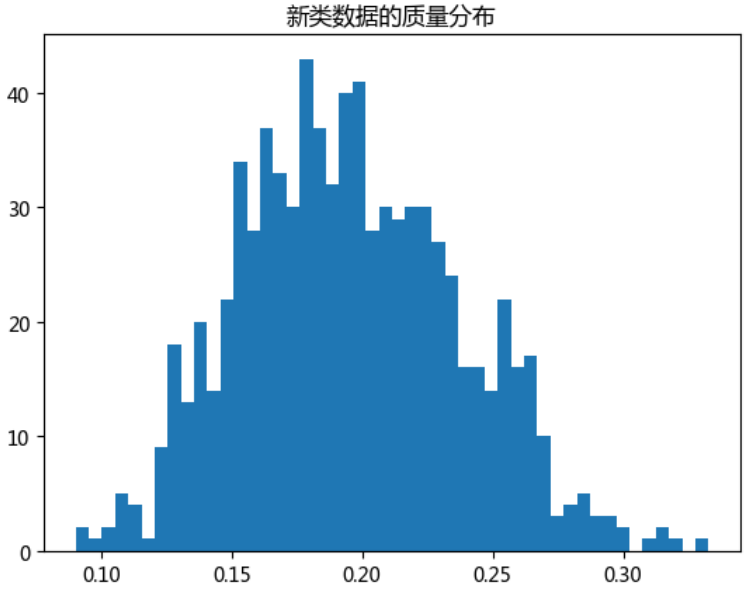
单点质量分布

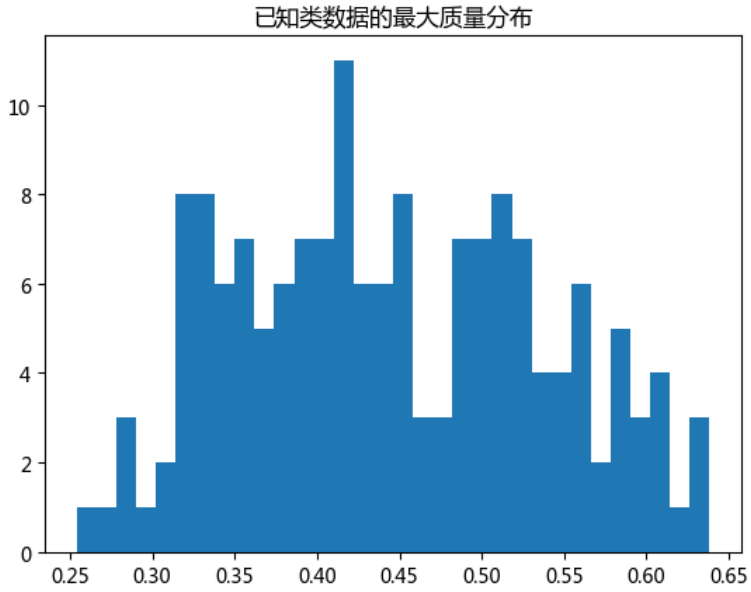
p_1 p_2 p_3 p_4 p_5

160*5




40
30
20
10
0
0.1
0.2
0.3
0.4
0.5
0.6


新类数据的质量分布
40
30
20
10
0
0.10
0.15
0.20
0.25
0.30


已知类数据的最大质量分布
10
8
6
4
2
0
0.25
0.30
0.35
0.40
0.45
0.50
0.55
0.60
0.65

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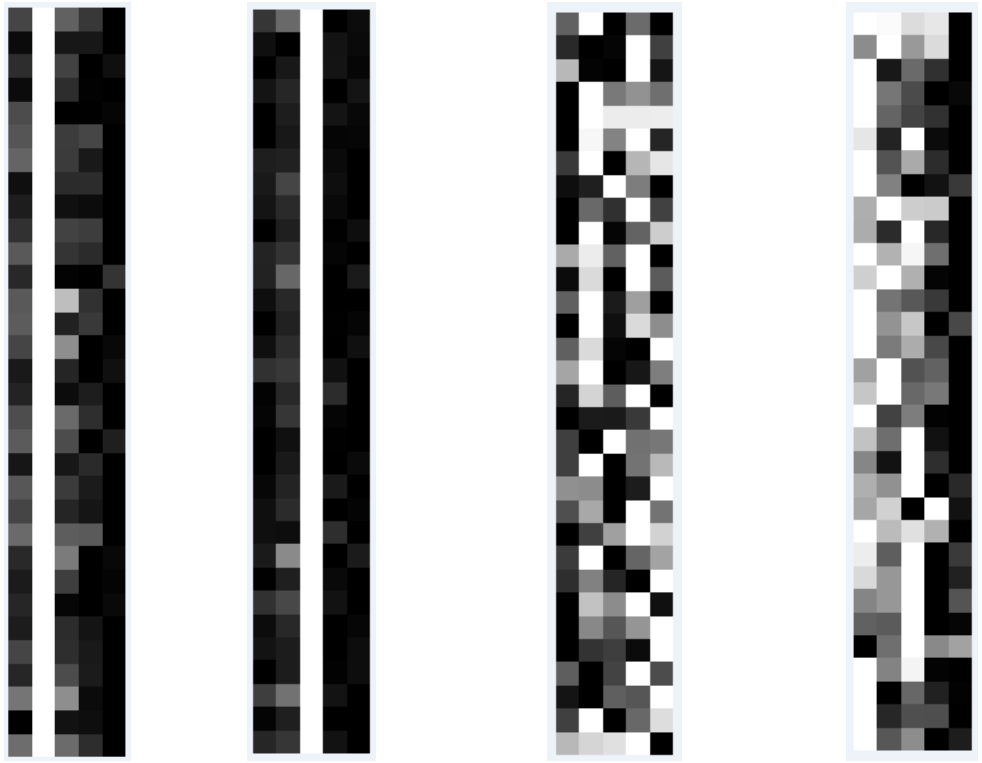


阈值设定与判定 ?

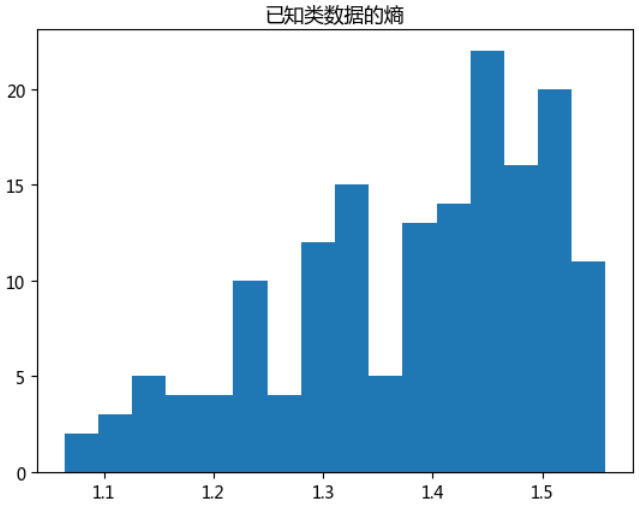
$$c = \arg\max_k \ p_k$$

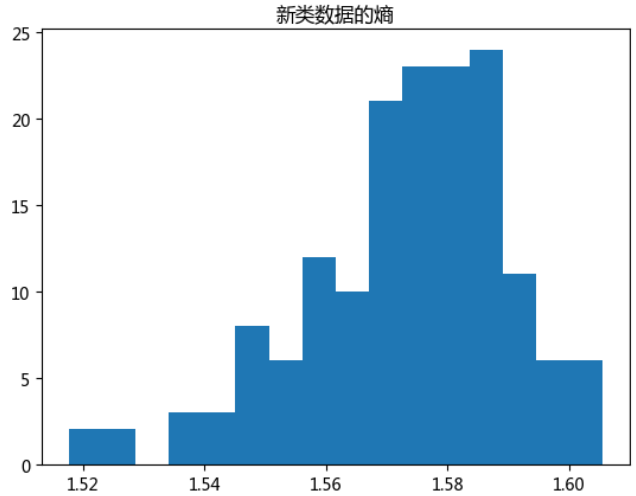
$$0.5 * \ (\min(True) + \max(False))$$

accurate=70.625%

accurate=99.375%

entropy





KL Divergence

$$\mathrm{H} = -\sum_{i=1}^{K} p_i \log \frac{p_i}{q_i}$$

判定：广义极值分布

LRR $\min_{Z,E} ||Z||_* + \lambda\|E\|_{2,1} \quad \text{s.t. } X = XZ + E$

LatLRR $\min_{Z,L} \|Z\|_* + \|L\|_* \quad s.t. X = XZ + LX$

测试复杂度？ 懒学习？ 线性单点预测 160 test points 59 minutes

可能解决方法 增量SVD分解？ $Z^* = V_X(I - S)V_X^T$

是否约束？ $\min_{\alpha_i} \left\| \sum_{i=1}^{r} \alpha_i M_i \right\|_{2,1} \quad s.t. \sum_i \alpha_i = Const$

$$\min_{\substack{S_{11},\dots,S_{rr} \\ \widetilde{W}_1,\dots,\widetilde{W}_r}} \sum_{i=1}^{r} \left(\left\| \widetilde{H}_i - S_{ii}\sigma_i \widetilde{W}_i \right\|_2^2 + \alpha ||\widetilde{W}_i||_2^2 \right) \qquad \text{s.t. } S_{ii} \geq 0, i = 1,2,\dots,r$$

$$\sum_{i=1}^{r} S_{ii} = t \qquad \sum_{i=1}^{r} S_{ii}\sigma_i = t \qquad g = [S_{11}\sigma_1, \dots, S_{rr}\sigma_r]^T \quad Q = \left[S_{11}\sigma_1 \widetilde{W}_1, \dots, S_{rr}\sigma_r \widetilde{W}_r\right]$$