

- 10.17第四次上机课
 - 1. simple bayes
 - 2. Gauss bayes

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1. simple bayes

是

$p_1=1.6875$, $p_2=0.0625$, $p_1 > p_2$

code:

```
% 大小 颜色 形状 是否好果子
% 大1 红1 圆1 是1
data = [
    0,0,0,0;
    1,1,0,1;
    1,1,1,1;
    1,0,1,1;
    1,0,0,0;
    0,1,1,1;
    0,1,0,0;
    0,0,1,0;
];

% m个数据, n个维度
% p_vecx_1(1) = p(x=1)
% p_vecx_1(4) = p(C=1)
[m,n] = size(data);
for i = 1:n-1
    p_vecx_1(i) = sum(data(:,i))/m;
end
p_C_1 = sum(data(:,n))/m;

% here, temp_data only consider Ck=1
temp_data = data;
for i = 1:m
    if temp_data(i,n) == 0
        temp_data(i,1:n-1) = 0
    end
end
temp_m = sum(temp_data(:,n));
for i = 1:n-1
    p_vecx_1_C1(i) = sum(temp_data(:,i))/temp_m;
end
```

```

p_vecx_1_C0 = (p_vecx_1-p_C_1*p_vecx_1_C1)/(1-p_C_1);

input = [1,1,1];
p1 =
p_vecx_1_C1(1)*p_vecx_1_C1(2)*p_vecx_1_C1(3)*p_C_1/(p_vecx_1(1)*p_vecx_1(2)*
p_vecx_1(3));
p2 = p_vecx_1_C0(1)*p_vecx_1_C0(2)*p_vecx_1_C0(3)*(1-
p_C_1)/(p_vecx_1(1)*p_vecx_1(2)*p_vecx_1(3));

```

2. Gauss bayes

男

$\ln_p0 = -25.971197781768100$ $\ln_p1 = -13.131434139811583$

code:

```

% 身高, 体重, 脚长, 性别
% 男1
data = [
    6, 180, 12, 1;
    5.92, 190, 11, 1;
    5.58, 170, 12, 1;
    5.92, 165, 10, 1;
    5, 100, 6, 0;
    5.5, 150, 8, 0;
    5.42, 130, 7, 0;
    5.75, 150, 9, 0;
];

[m,n] = size(data);
p_C_1 = sum(data(:,n))/m;
n = n-1;

% %Sigma_Omega
% mu = sum(data(:,1:3))/m;
% Sigma_Omega = zeros(n,n);
% for l = 1:m
%     vec_x_mu = data(l,1:3)-mu;
%     Sigma_Omega = Sigma_Omega + vec_x_mu'*vec_x_mu;
% end

%Sigma_1
temp_data = data(1:4,:);
[temp_m,~] = size(temp_data);
mu_1 = sum(temp_data(:,1:3))/temp_m;
Sigma_1 = zeros(n,n);
for l = 1:temp_m

```

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        vec_x_mu = temp_data(l,1:3)-mu_1;
        Sigma_1 = Sigma_1 + vec_x_mu'*vec_x_mu;
    end
    %Sigma_0
    temp_data = data(5:8,:);
    [temp_m,~] = size(temp_data);
    mu_0 = sum(temp_data(:,1:3))/temp_m;
    Sigma_0 = zeros(n,n);
    for l = 1:temp_m
        vec_x_mu = temp_data(l,1:3)-mu_0;
        Sigma_0 = Sigma_0 + vec_x_mu'*vec_x_mu;
    end
    %calculate
    Sigma_0 = Sigma_0/3;
    Sigma_1 = Sigma_1/3;
    x = [6,130,8];
    vec_x_mu = x-mu_1;
    ln_p1 = -1/2*(log(det(Sigma_1))+vec_x_mu*inv(Sigma_1)*vec_x_mu');
    %+log(p_C_1);
    %ln_p1 = ln_p1 + 1/2*
    (log(abs(det(Sigma_0omega)))+vec_x_mu*Sigma_0omega*vec_x_mu'/7);
    vec_x_mu = x-mu_0;
    ln_p0 = -1/2*(log(det(Sigma_0))+vec_x_mu*Sigma_0^(-1)*vec_x_mu');
    %+log(1-p_C_1);
    %ln_p0 = ln_p0 + 1/2*
    (log(abs(det(Sigma_0omega)))+vec_x_mu*Sigma_0omega*vec_x_mu'/7);

```