

report

Contents

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%%Report
%STUID 15307130224
%GUOZHEN SHE

%%Question 1
%Choose -5, -3, 6 as the best three value, so the A
    approximation is  $-5*u1*v1'+(-3)*u3*v3'+6*u5*v5'$ 

%%Question 2 Plot the curve
pkg load image;

raw = imread('logo.jpg');
gray = rgb2gray(raw);
target = double(gray)/255;

K = 100;

[U,S,V] = svd(target);
errors = zeros(1,K);
indexes = linspace(1,K,K);
for k = 1:10
    sum = U(:,1:k)*S(1:k,1:k)*V(:,1:k)';
    errors(k) = norm(sum-target, 'fro');
end

plot(indexes, errors);

%%Question 3
pkg load image;

m = 40
training_matrix = zeros(10304,m);
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hit_count = 0
%Pre
for i = 1:m
    train_path = ['att_faces/s', num2str(i), '/1.pgm'];
    training_image = imread(train_path);
    hit_count = 30;
    training_image = double(training_image)/255;
    training_matrix(:,i) = reshape(training_image, size(
        training_image,1)*size(training_image,2),1);
end

%Standardize
x_average = zeros(10304,1);
for i = 1:m
    x_average += training_matrix(:,i);
end
x_average = x_average/m;

for i = 1:m
    training_matrix(:,i) = training_matrix(:,i) - x_average
    ;
end

[U,S,V] = svd(training_matrix);
Q = U(:,1:20);

% Test

% Compute projection of training set
projection_training_matrix = zeros(10304,40);
for i = 1:m
    projection_training_matrix(:,i) = Q*Q'*training_matrix
        (:,i);
end

%Compute test set

for i = 1:50
    target_people = unidrnd(40);
    target_number = unidrnd(8)+1;
    test_path = ['att_faces/s', num2str(target_people), '/',
        num2str(target_number), '.pgm'];

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test_image = imread(test_path);
test_image = double(test_image)/255;
test_vector = reshape(test_image, size(test_image,1)*
    size(test_image,2),1);
project_test = Q*Q'*test_vector;

match_error = 10000000;
match_index = 0;
for j = 1:m
    error = norm(project_test-projection_training_matrix
        (:,j), 'fro');
    if error < match_error
        match_index = j;
        match_error = error;
    end
end
if match_index == target_people
    hit_count += 1;
end
end
hit_count

m = 40
hit_count = 0
hit_count = 30

```

