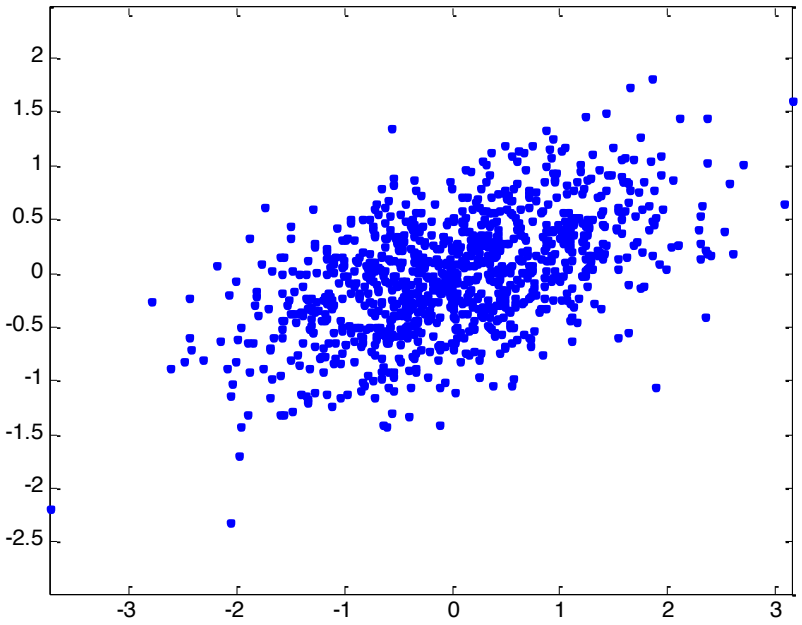
**CSE 5524 – Homework #0**

1/1/1900

John Smith

**1) Test MATLAB's ability to load data from a text file. Use data.txt from the class webpage.**

**2) Plot the data, which consists of x,y-vectors with one vector per row. What can you say about the data from its appearance?**




The data looks like it might be Gaussian-distributed but the variance in non-uniform and skewed.

**3) Compute the dot product of all data vectors with the following vector. Then compute the mean of the absolute values of all the dot products. Use for loops.**

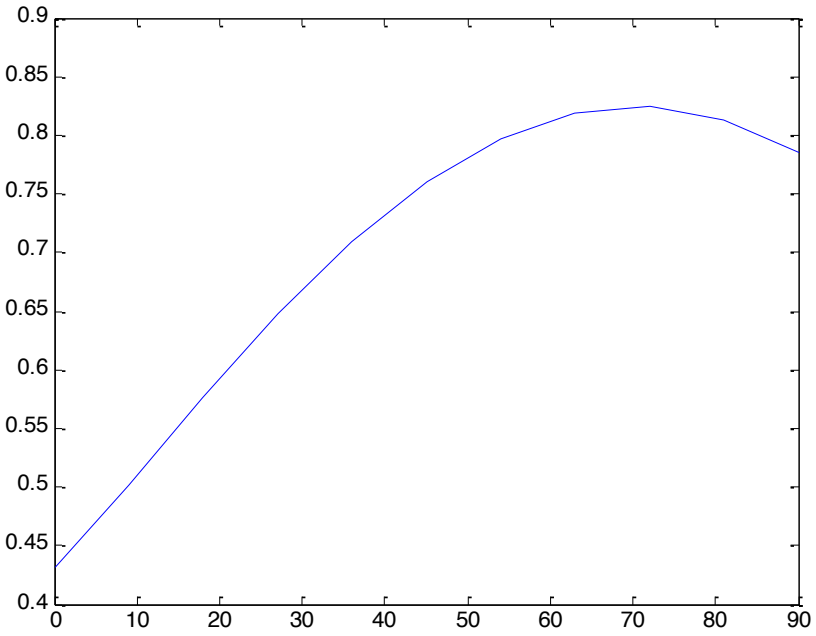
The mean was 0.4309.

**4) Now compute the same value using MATLAB's vector arithmetic.**

**5) Calculate the mean dot products for a number of vectors with varying angles.**

avgs=[ 0.4309 0.5020 0.5767 0.6474 0.7097 0.7598 0.7968 0.8194 0.8251
0.8136 0.7845 ]

**6) Plot the mean values as a function of angle. What does this tell you about the variance of the data?**




The direction of maximum variance for the data is where the plot peaks, roughly 70 degrees.

**7) Turn in all code, test images, printouts of images, and discussion of results. Make a HW0.m script to do the above tasks and call needed functions. Upload your code and selected images to Carmen.**

```
% John Smith
% CSE5524 - HW0
% 1/1/1900



%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Problem 1

data = load('data.txt');

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% Problem 2

plot(data(:,1),data(:,2),'.');
axis equal;
%print -dpng 'output/problem1.png'
print -dmeta 'output/problem1.emf' %Saving figure here to include in report

pause;



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% Problem 3

vector=[ 0 1 ];
avg=0;

for j = 1:size(data,1)

   dot=0;

   for i = 1:2
      dot=dot+vector(i)*data(j,i);
   end

   avg=avg+abs(dot);

end
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```
avg=avg/size(data,1)

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% Problem 4

avg=mean(abs(sum(repmat(vector,size(data,1),1).*data,2)))

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% Problem 5

vectors=[ sin(pi*(0:10)/20); cos(pi*(0:10)/20) ]';

avgs=zeros(1,size(vectors,1));

% % VERY SLOW

% for k = 1:size(vectors,1)

%    avg=0;

%    for j = 1:size(data,1)

%       dot=0;

%       for i = 1:2
%          dot=dot+vectors(k,i)*data(j,i);
%       end

%       avg=avg+abs(dot);

%    end

%    avgs(k)=avg/size(data,1);

% end


% % FAST
```

```
% for k = 1:size(vectors,1)
%     avgs(k)=mean(abs(sum(repmat(vectors(k,:),size(data,1),1).*data,2)));
% end


% FASTER

avgs=mean(abs(sum(...

   repmat(reshape(vectors,[ 1 size(vectors,1) 2 ]),[ size(data,1) 1 1 ]).*...

   repmat(reshape(data,[ size(data,1) 1 2 ]),[ 1 size(vectors,1) 1 ])...

,3)),1)


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% Problem 6

plot(9*(0:10),avgs);

%print -dpng 'output/problem6.png'

print -dmeta 'output/problem6.emf'

%pause; %Don't need pause at end
```