

Lab 13

CPS 563 – Data Visualization

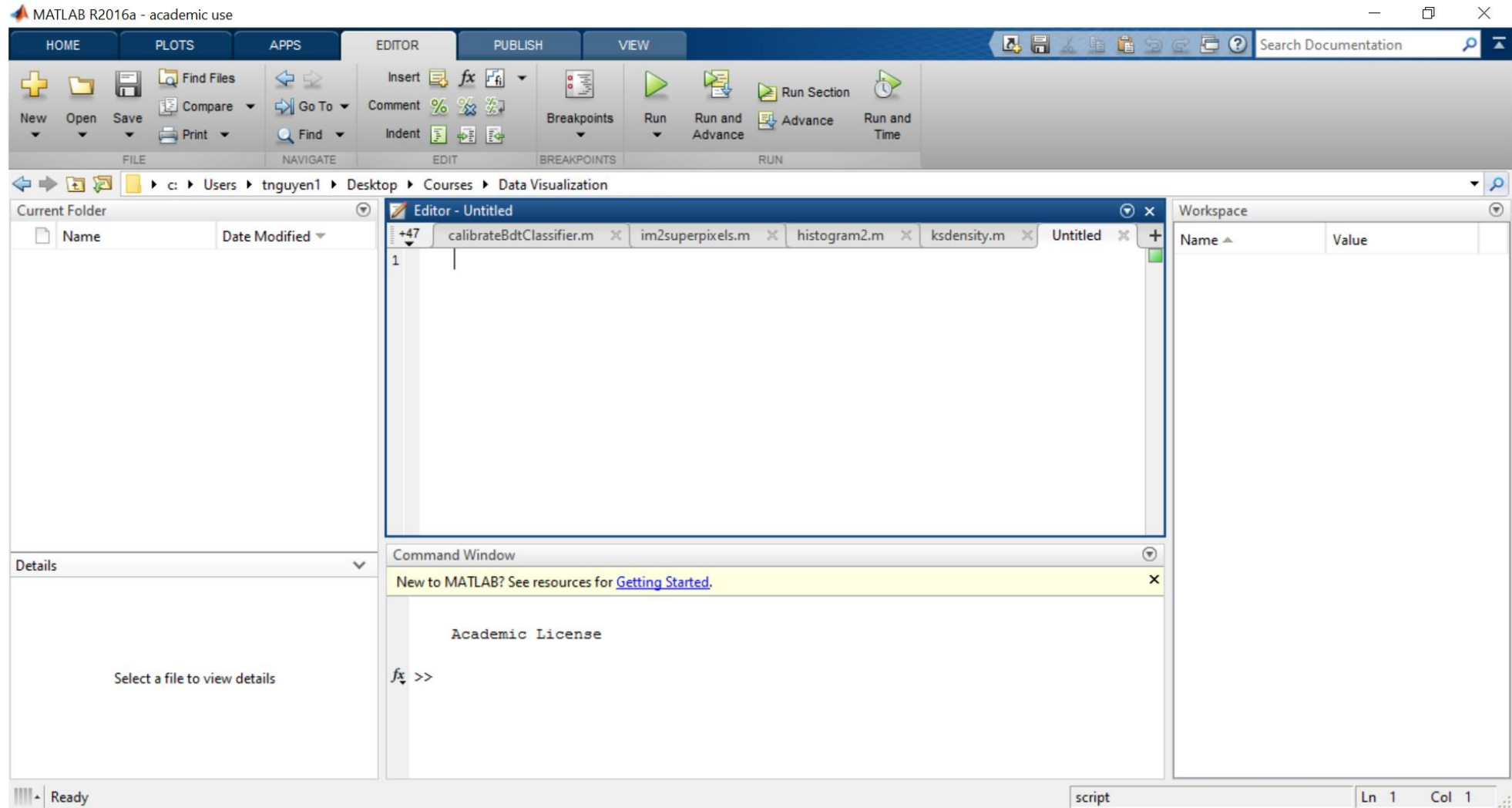
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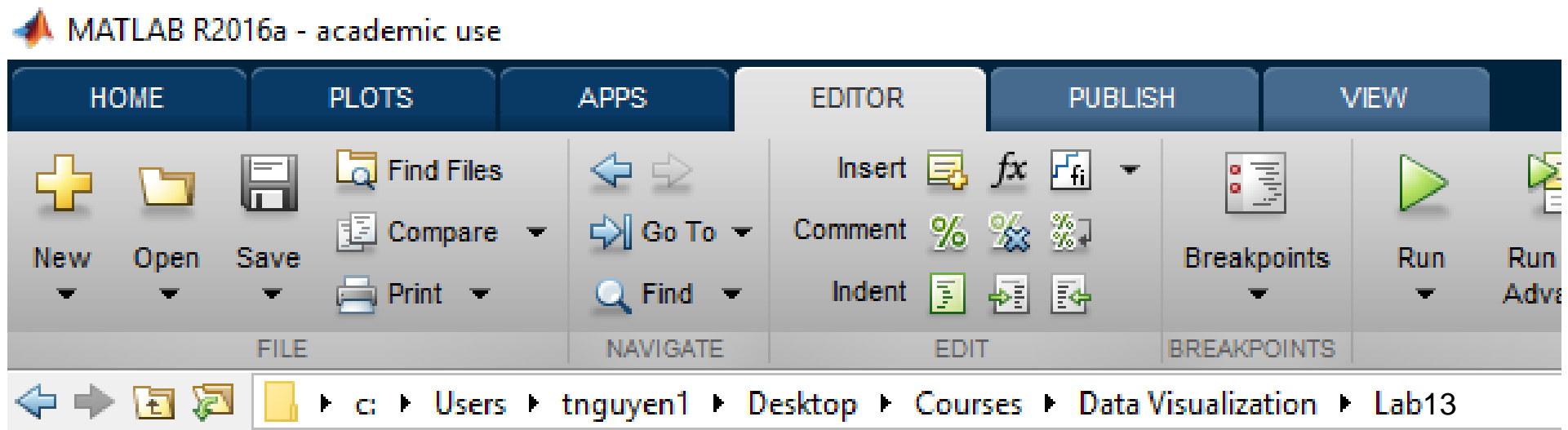
Outline

- Perform k means clustering
- Visualize clustered data in different dimensionalities

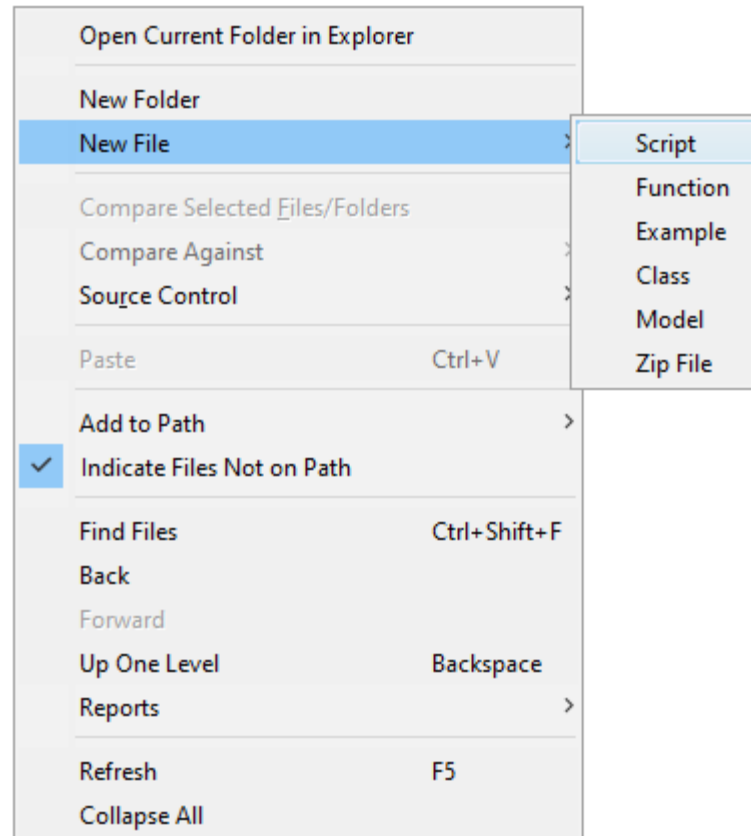
Start MATLAB



Create Lab 13 folder



Create new script file: Lab13a.m



Lab13a.m

```
close all;
```

```
clear all;
```

```
clc;
```

Lab13a.m – Prepare data

```
close all;
```

```
clear all;
```

```
clc;
```

```
load fisheriris;%meas 1:sepal length, 2: sepal width, 3:petal length, 4: petal width
```

Lab13a.m – Perform k means clustering

```
close all;
```

```
clear all;
```

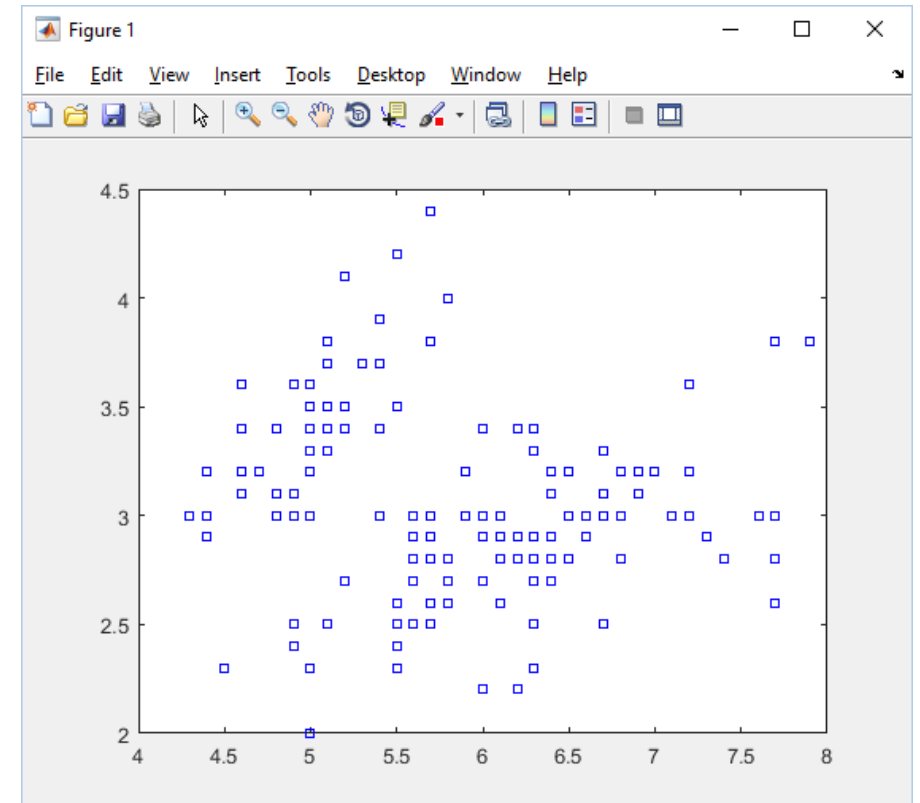
```
clc;
```

```
load fisheriris;%meas 1:sepal length, 2: sepal width, 3:petal length, 4: petal width
```

```
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');
```

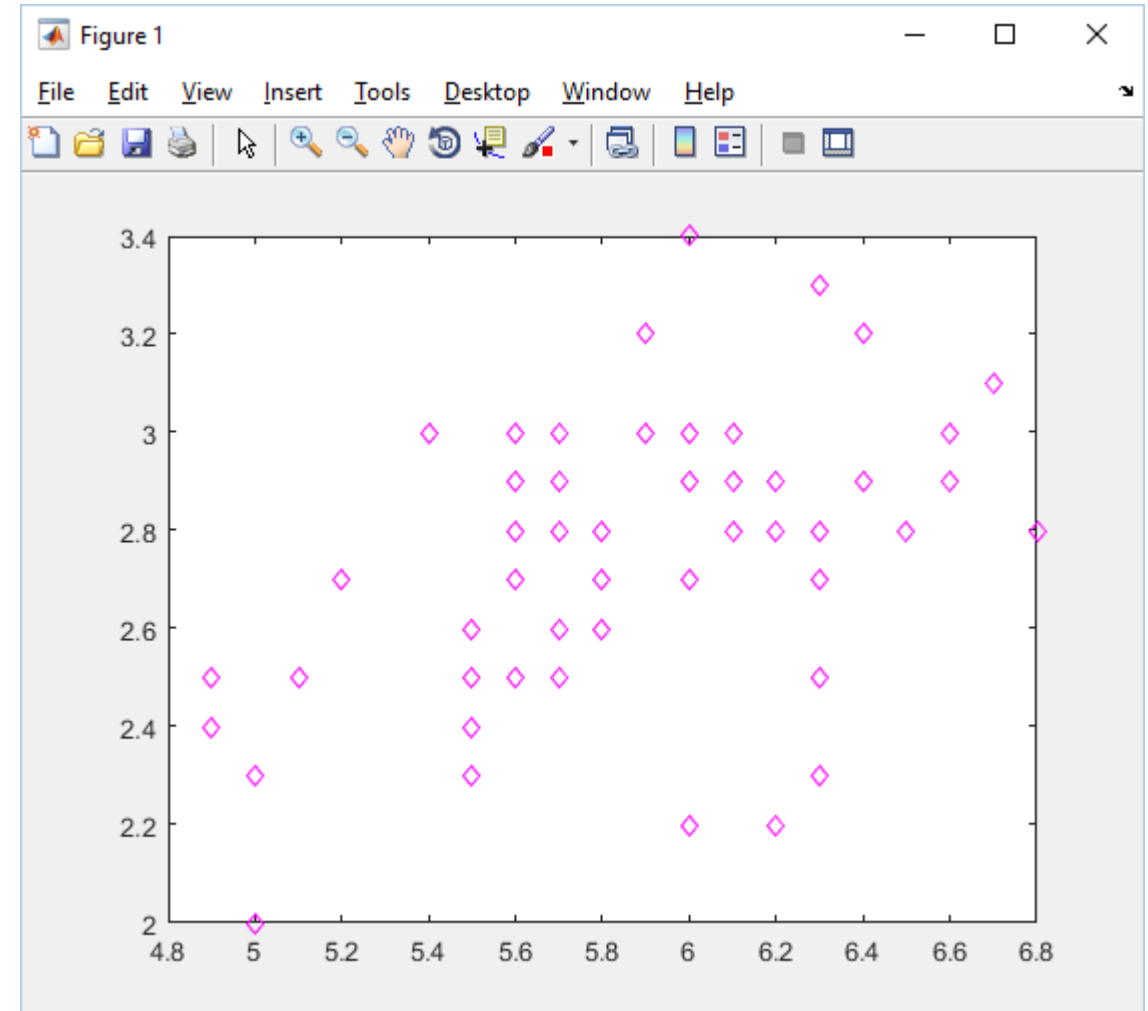

Lab13a.m – Visualize the clustering results

```
close all;  
clear all;  
clc;  
  
load fisheriris;  
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');  
figure;  
plot(meas(:,1),meas(:,2),'bs','MarkerSize',5);
```

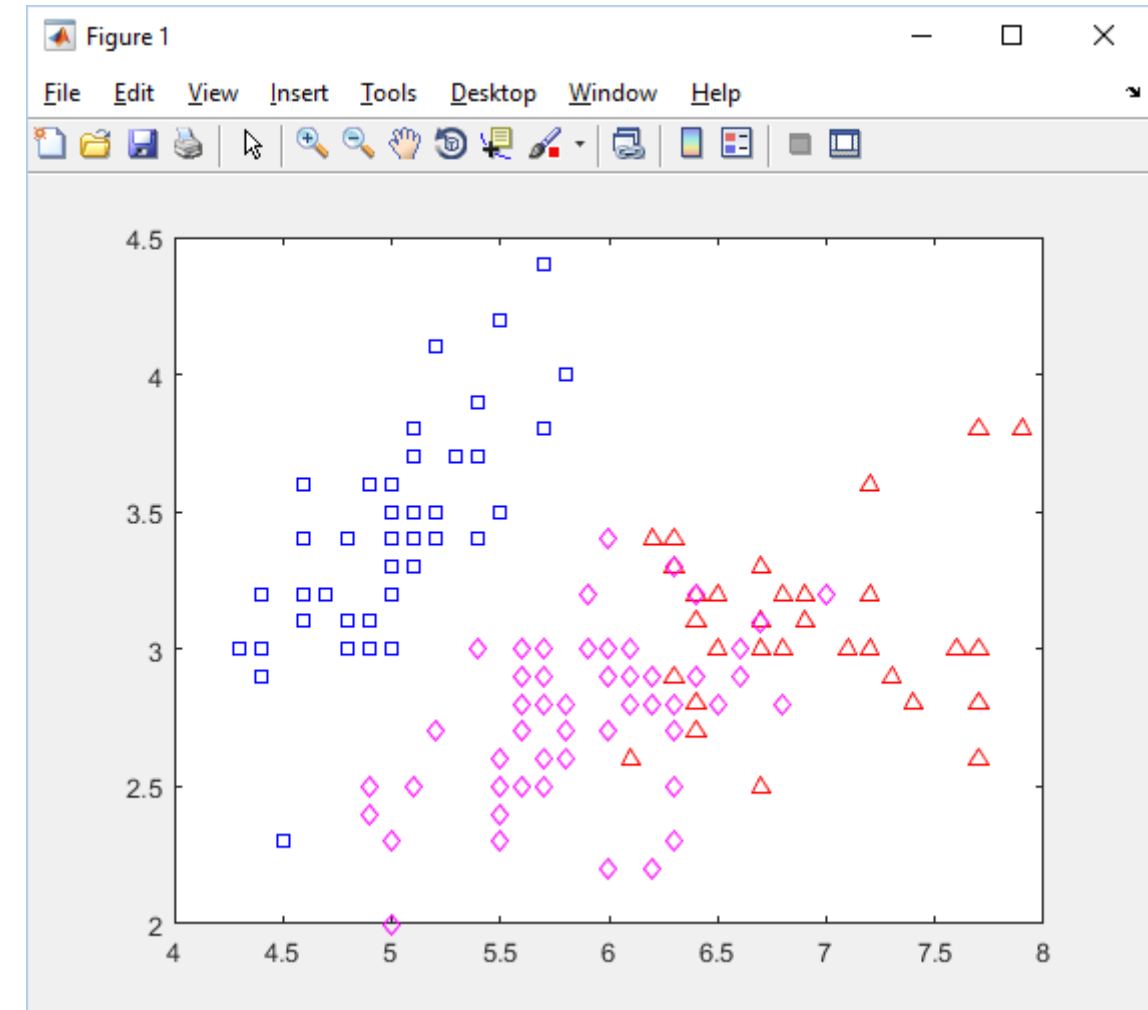
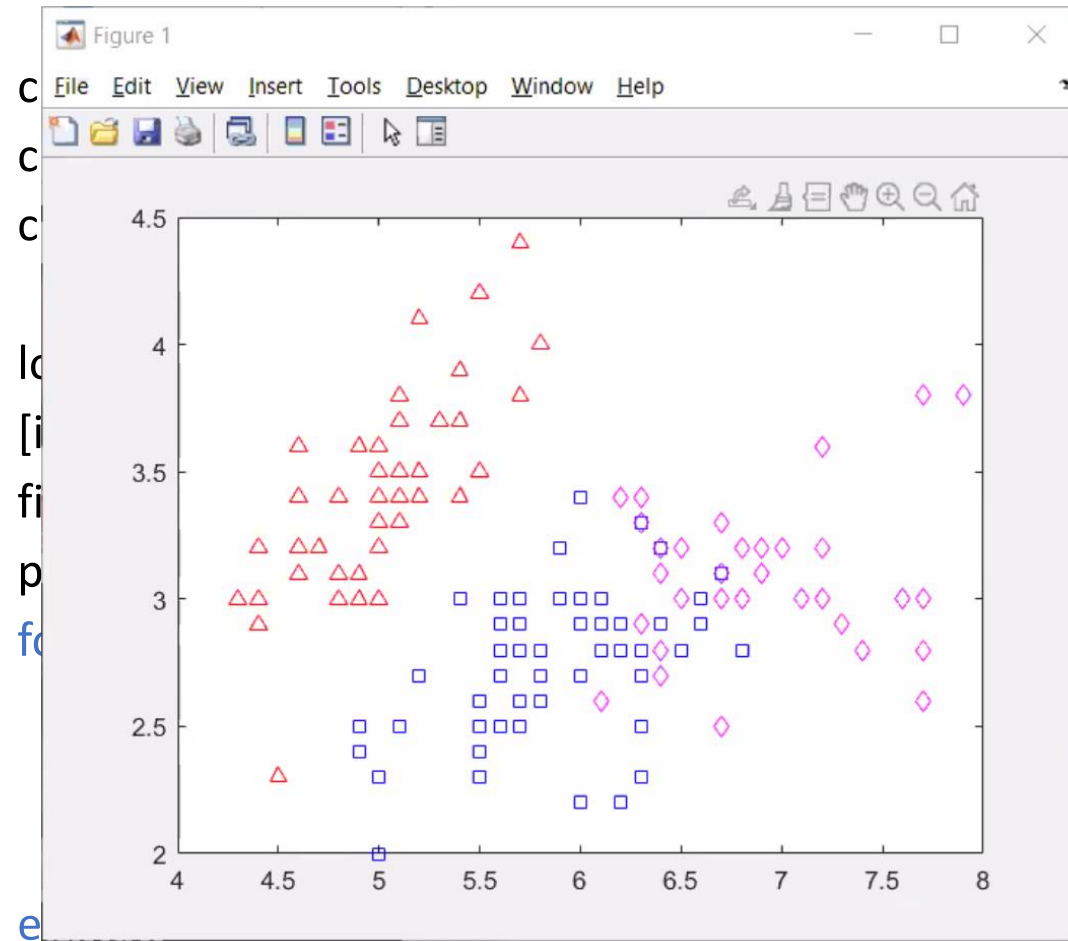


Lab13a.m – Visualize the clustering results

```
close all;  
clear all;  
clc;  
  
load fisheriris;  
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');  
figure;  
ptsymb = {'bs','r^','md','go','c+'};  
for i = 1:3  
    clust = find(idx==i);  
    plot(meas(clust,1),meas(clust,2),ptsymb{i});  
end
```

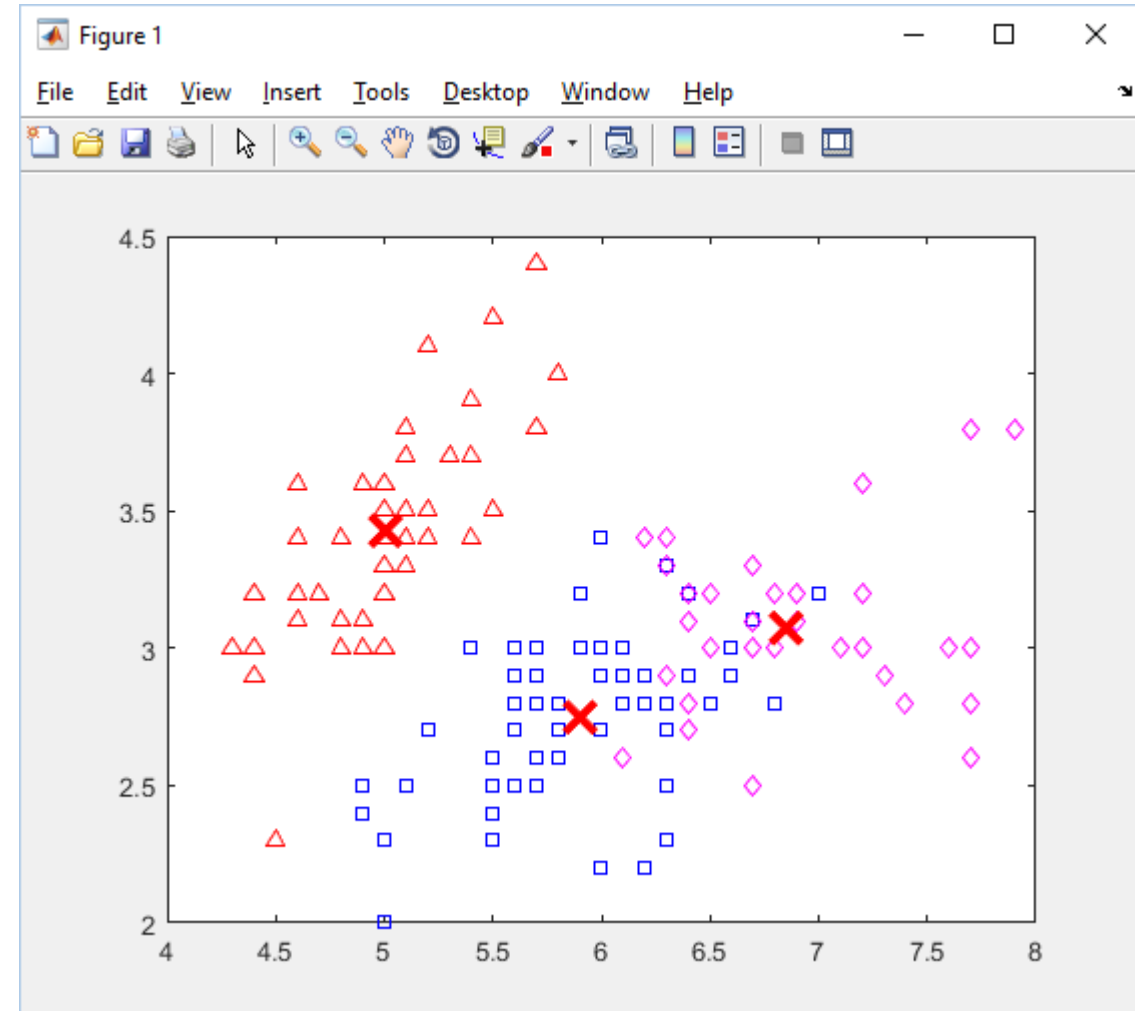


Lab13a.m – Visualize the clustering results



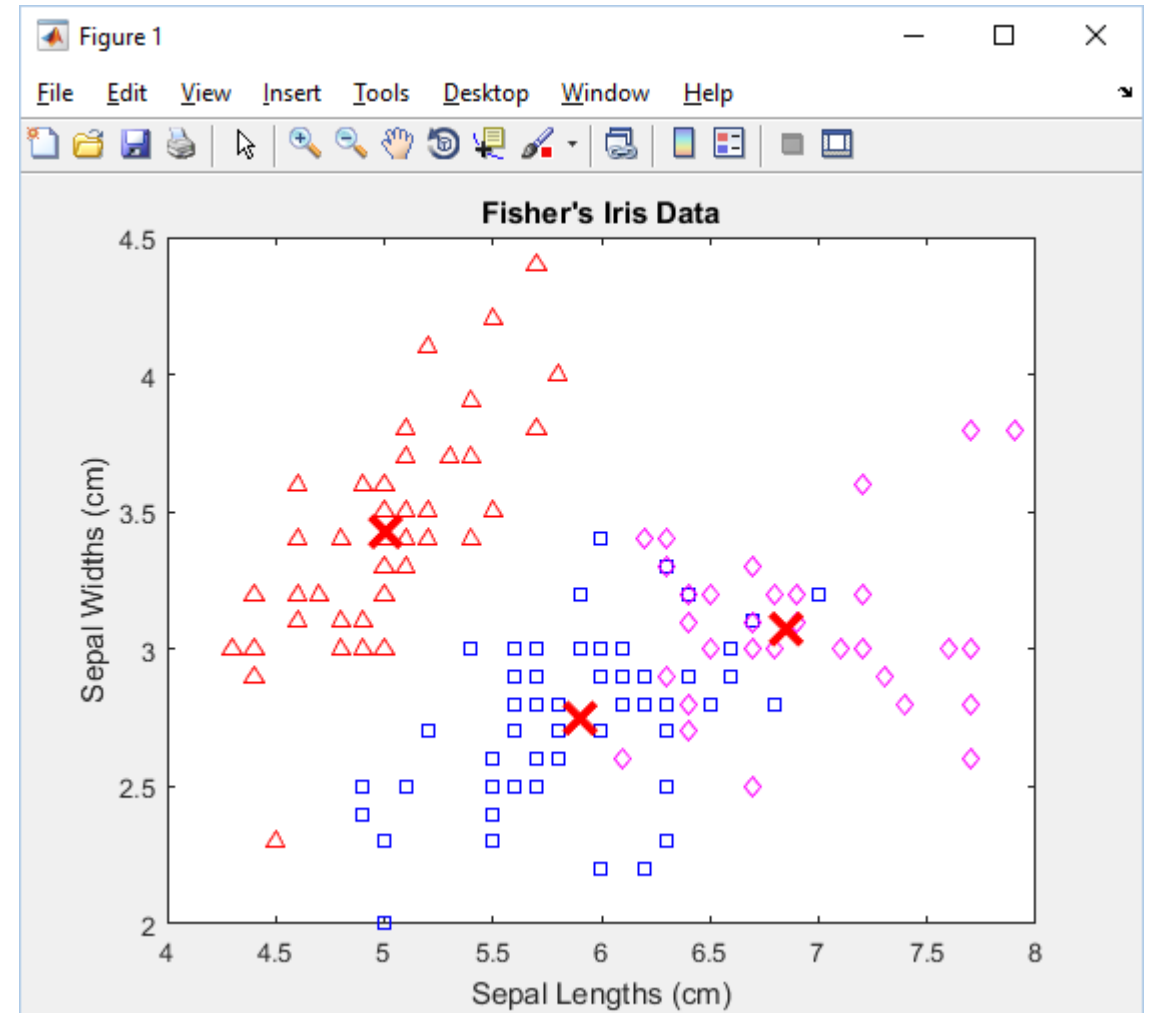
Lab13a.m – Visualize the centroids

```
load fisheriris;  
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');  
figure;  
ptsymb = {'bs','r^','md','go','c+'};  
for i = 1:3  
    clust = find(idx==i);  
    plot(meas(clust,1),meas(clust,2),ptsymb{i});  
    hold on;  
end  
plot(C(:,1),C(:,2),'rx','MarkerSize',15,'LineWidth',3);
```

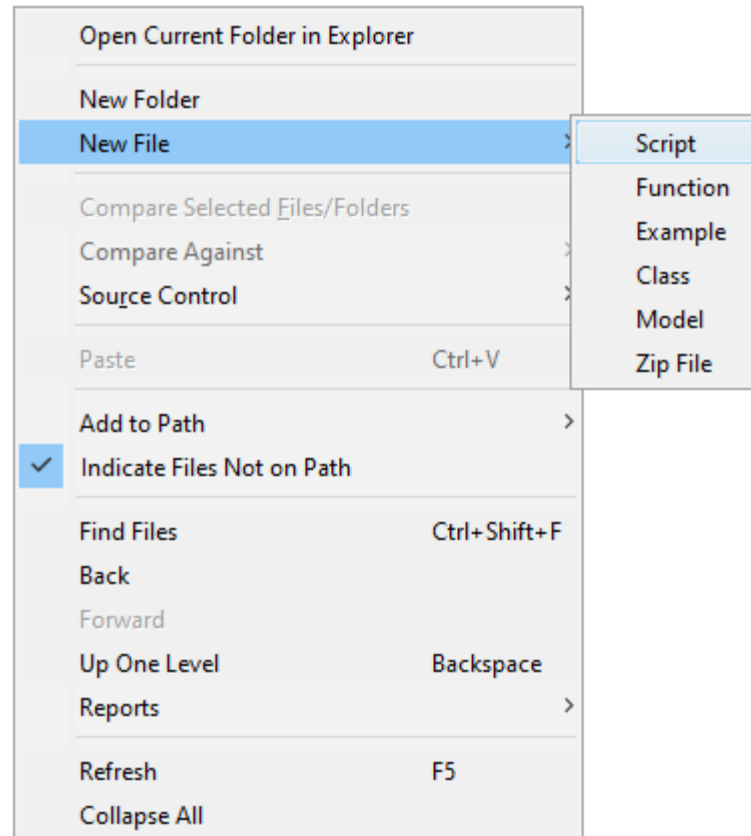


Lab13a.m – Add title and axes

```
figure;  
ptsymb = {'bs','r^','md','go','c+'};  
for i = 1:3  
    clust = find(idx==i);  
    plot(meas(clust,1),meas(clust,2),ptsymb{i});  
    hold on;  
end  
plot(C(:,1),C(:,2),'rx','MarkerSize',15,'LineWidth',3);  
title 'Fisher''s Iris Data';  
xlabel('Sepal Lengths (cm)');  
ylabel('Sepal Widths (cm)');  
hold off;
```



Create new script file: Lab13b.m



Lab13b.m

```
close all;
```

```
clear all;
```

```
clc;
```

Lab13b.m – Prepare data and perform k means

```
close all;
```

```
clear all;
```

```
clc;
```

```
load fisheriris
```

```
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');
```


Lab13b.m – Visualize clustering results

```
load fisheriris
```

```
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');
```

```
ptsymb = {'bs','r^','md','go','c+'};
```

```
for i = 1:3
```

```
    clust = find(idx==i);
```

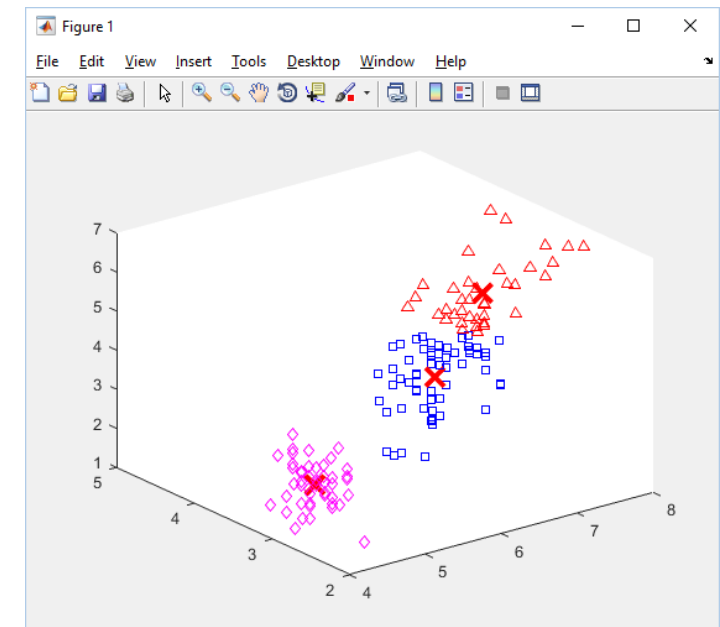
```
    plot3(meas(clust,1),meas(clust,2),meas(clust,3),ptsymb{i});
```

```
    hold on
```

```
end
```

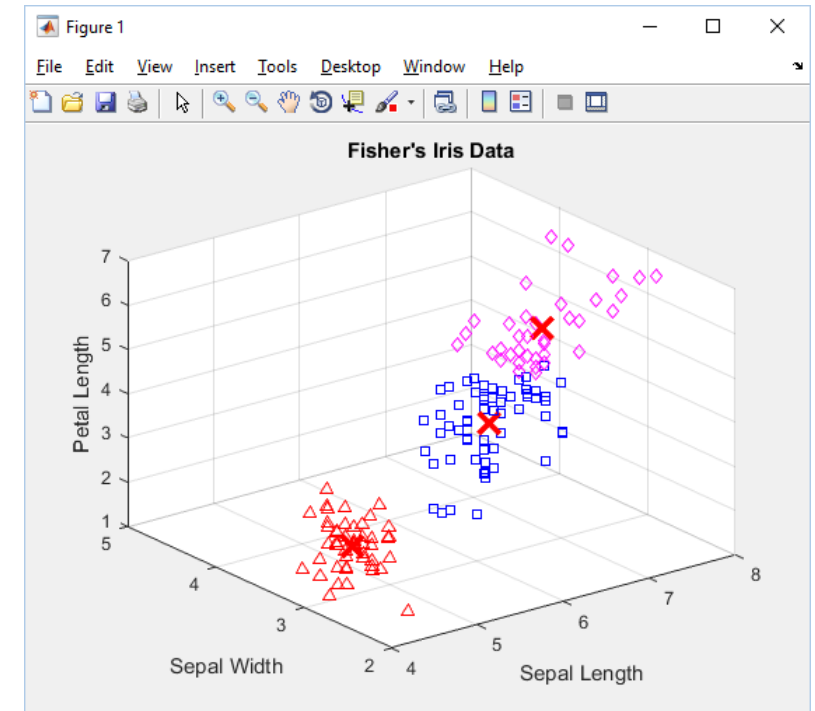
```
plot3(C(:,1),C(:,2),C(:,3),'rx','MarkerSize',15,'LineWidth',3);
```

```
hold off
```

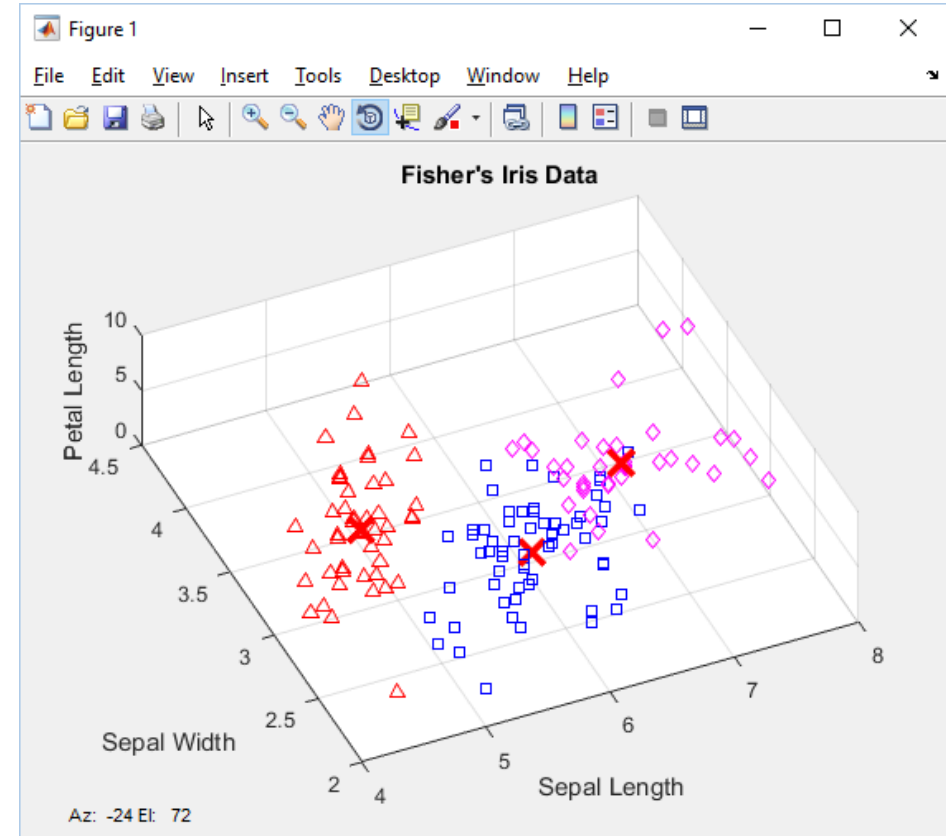
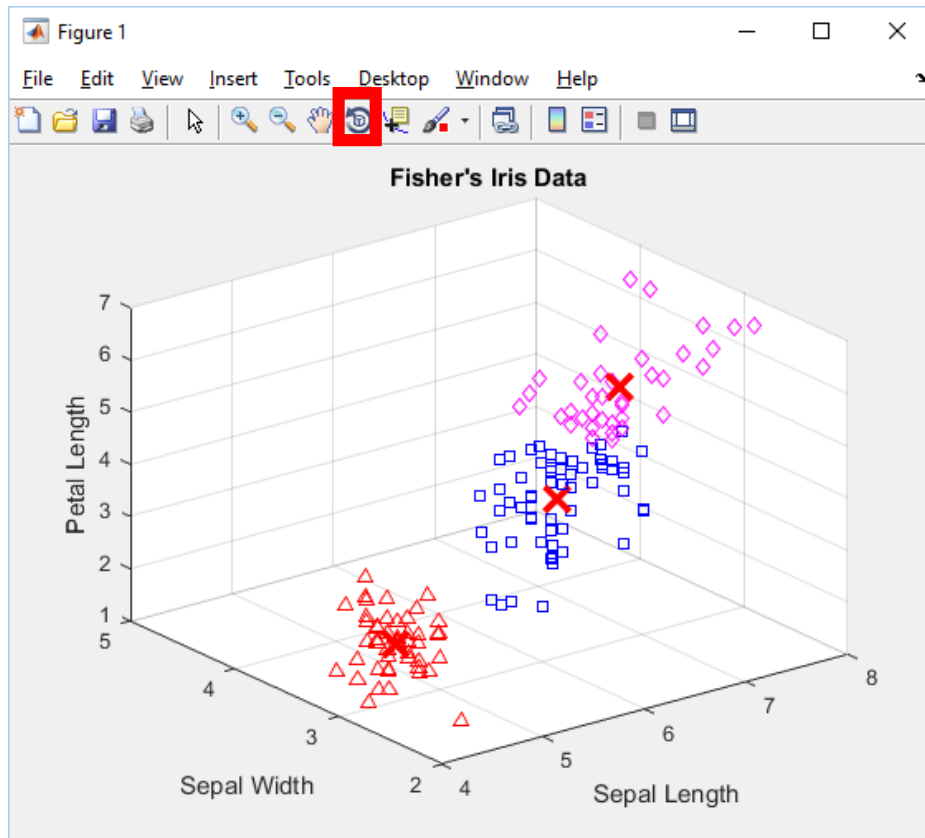


Lab13b.m – Add title, axes and grid

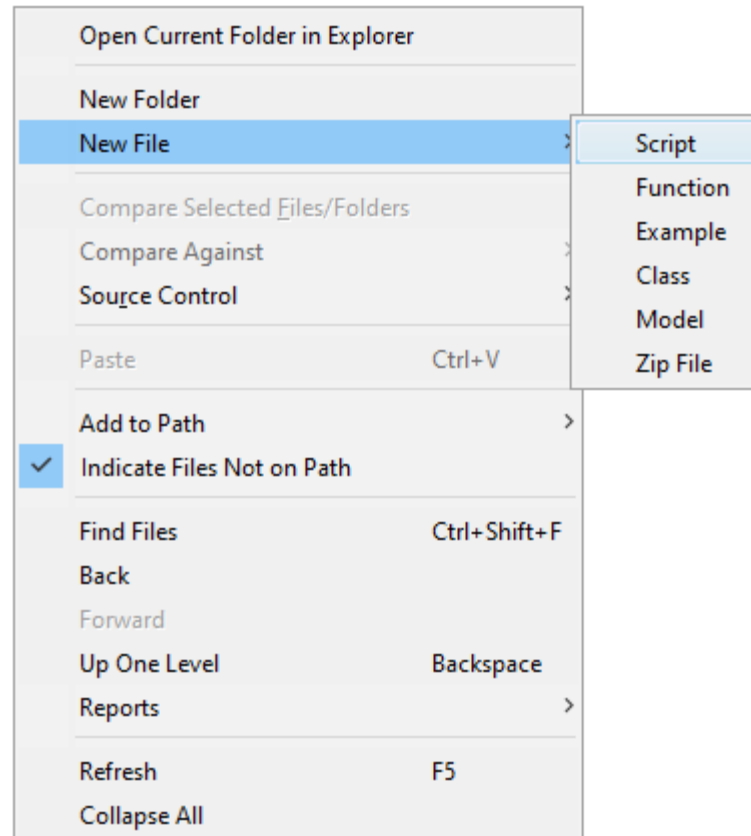
```
ptsymb = {'bs','r^','md','go','c+'};  
for i = 1:3  
    clust = find(idx==i);  
    plot3(meas(clust,1),meas(clust,2),meas(clust,3),ptsymb{i});  
    hold on  
end  
plot3(C(:,1),C(:,2),C(:,3),'rx','MarkerSize',15,'LineWidth',3);  
hold off  
title('Fisher''s Iris Data');  
xlabel('Sepal Length');  
ylabel('Sepal Width');  
zlabel('Petal Length');  
grid on
```



Explore the visualization in 3D



Create new script file: Lab13c.m



Lab13c.m

close all;

clear all;

clc;

Lab13c.m – Prepare data and perform k means

```
close all;
```

```
clear all;
```

```
clc;
```

```
load fisheriris
```

```
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');
```

Lab13c.m – Visualize clustered data with PC

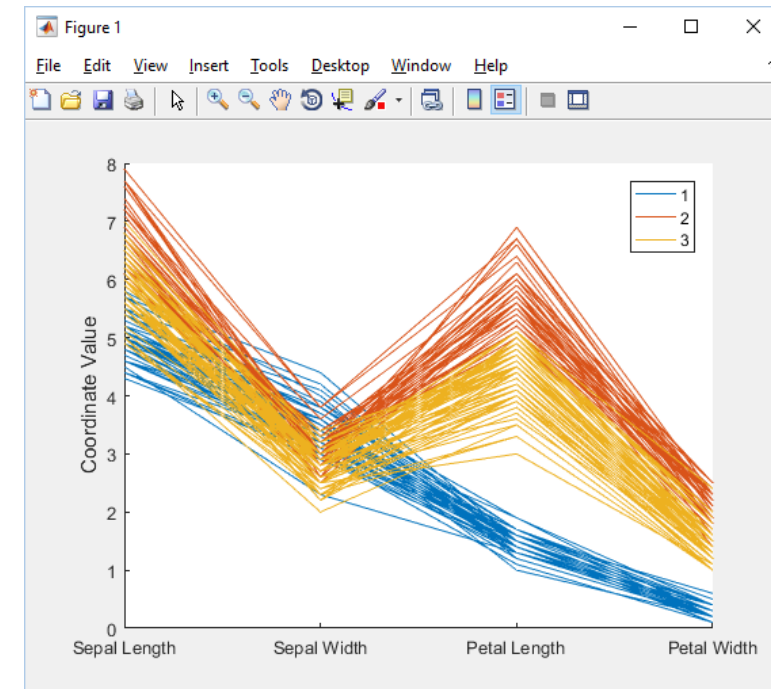
```
close all;  
clear all;  
clc;
```

```
load fisheriris
```

```
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');
```

```
labels = {'Sepal Length','Sepal Width','Petal Length','Petal Width'};
```

```
figure, h = parallelcoords(meas,'Group',idx,'Labels',labels);
```



Lab13c.m – Prepare data and perform k means

close all;

clear all;

clc;

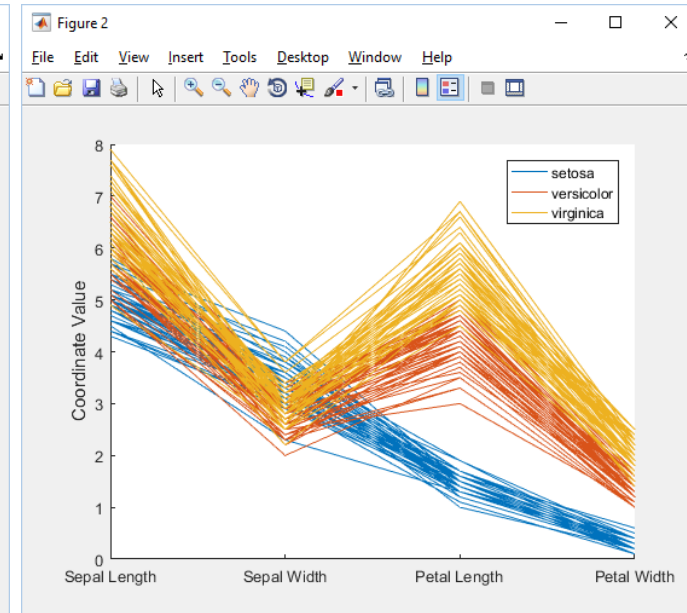
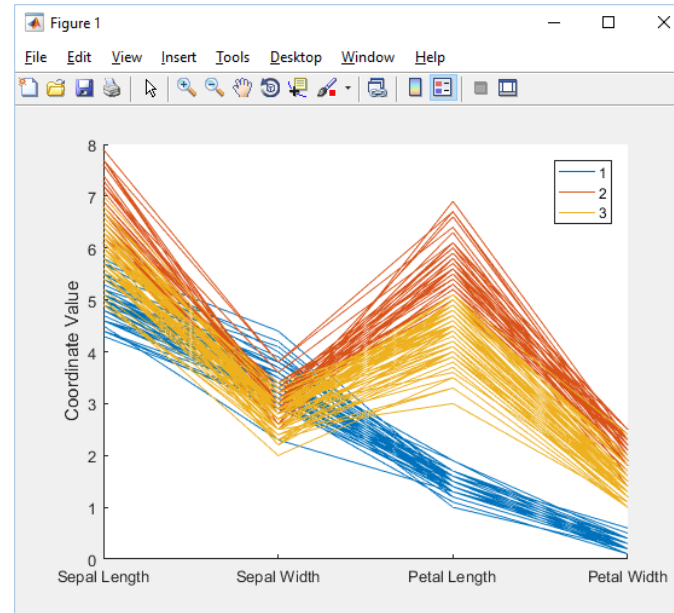
load fisheriris

```
[idx,C] = kmeans(meas,3,'dist','sqeuclidean');
```

```
labels = {'Sepal Length','Sepal Width','Petal Length','Petal Width'};
```

```
figure, h = parallelcoords(meas,'Group',idx,'Labels',labels);
```

```
figure, h = parallelcoords(meas,'Group',species,'Labels',labels);
```



Q&A

