University of Dayton

Lab 13

CPS 563 – Data Visualization

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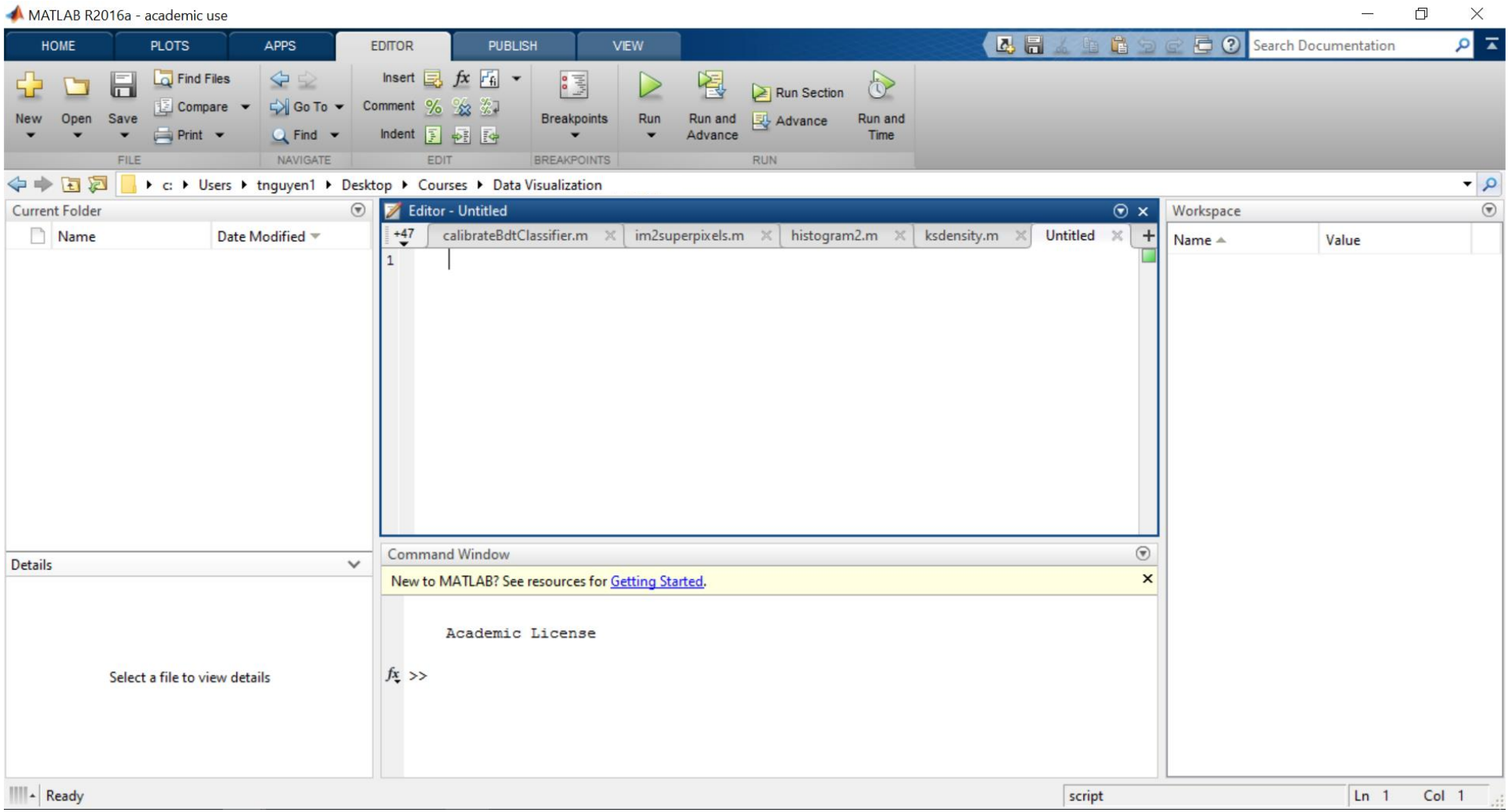
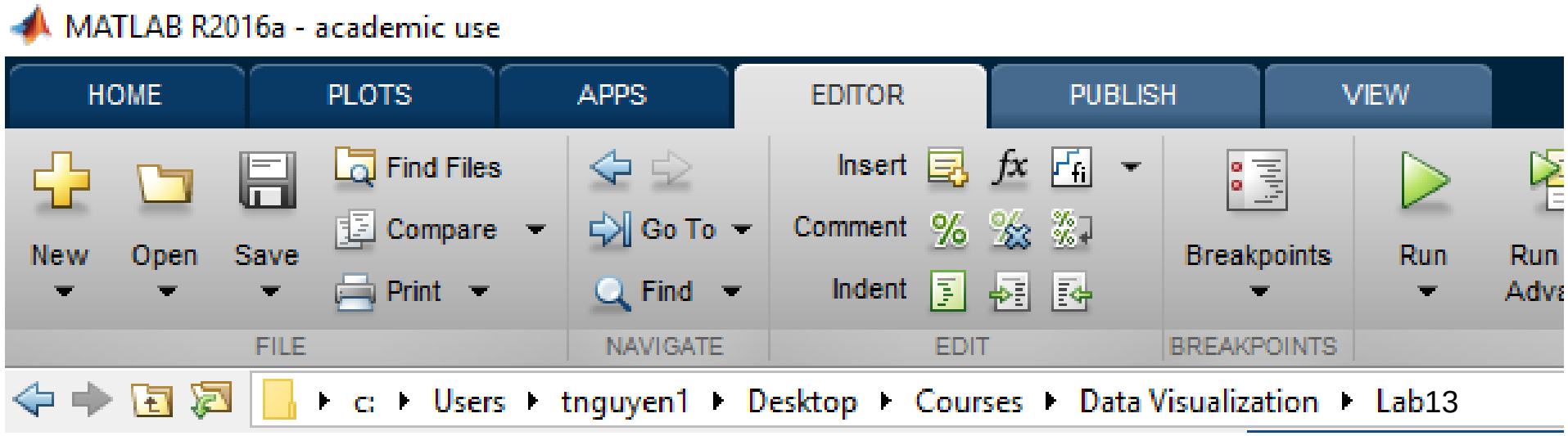
Outline

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

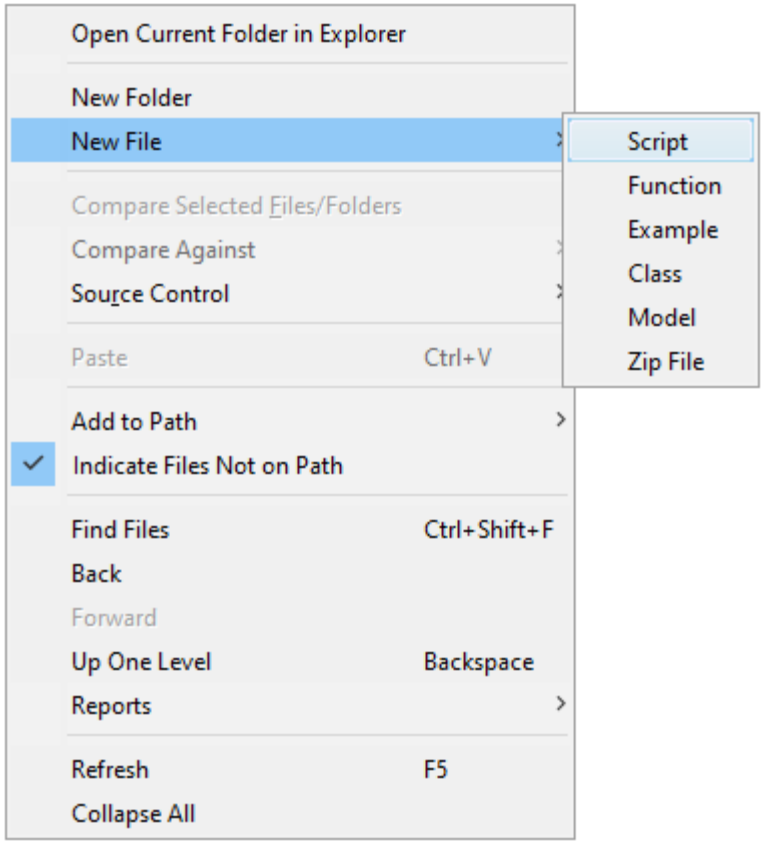
Start MATLAB



Create Lab 13 folder



Create new script file: Lab13a.m



Lab13a.m

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

Lab13a.m – Prepare data

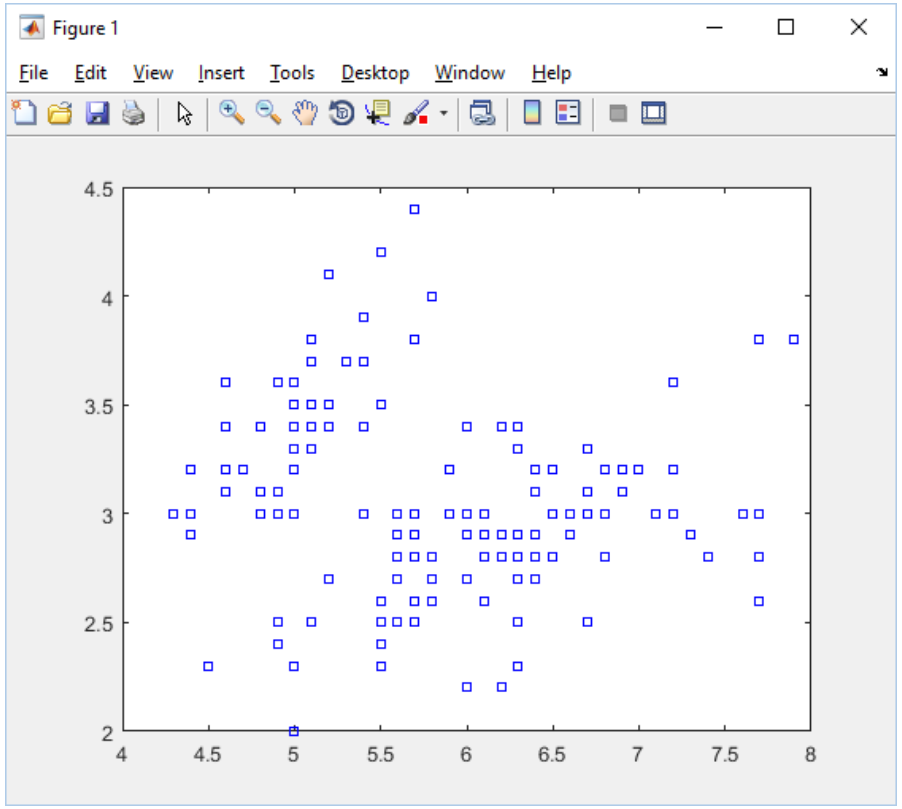
```
close all;
clear all;
clc;

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');
```

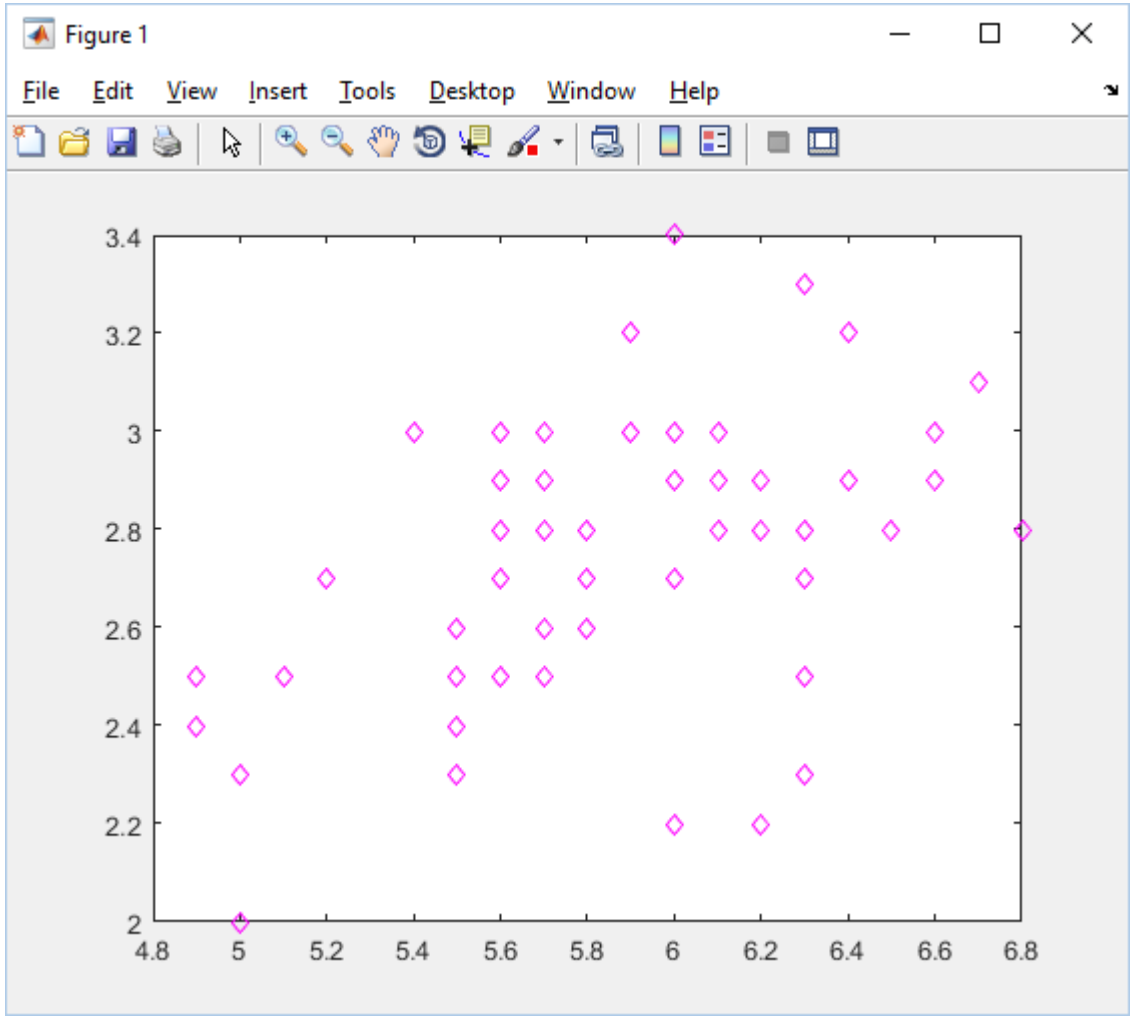
Lab13a.m – Visualize the clustering results

```
close all;
clear all;
clc;

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



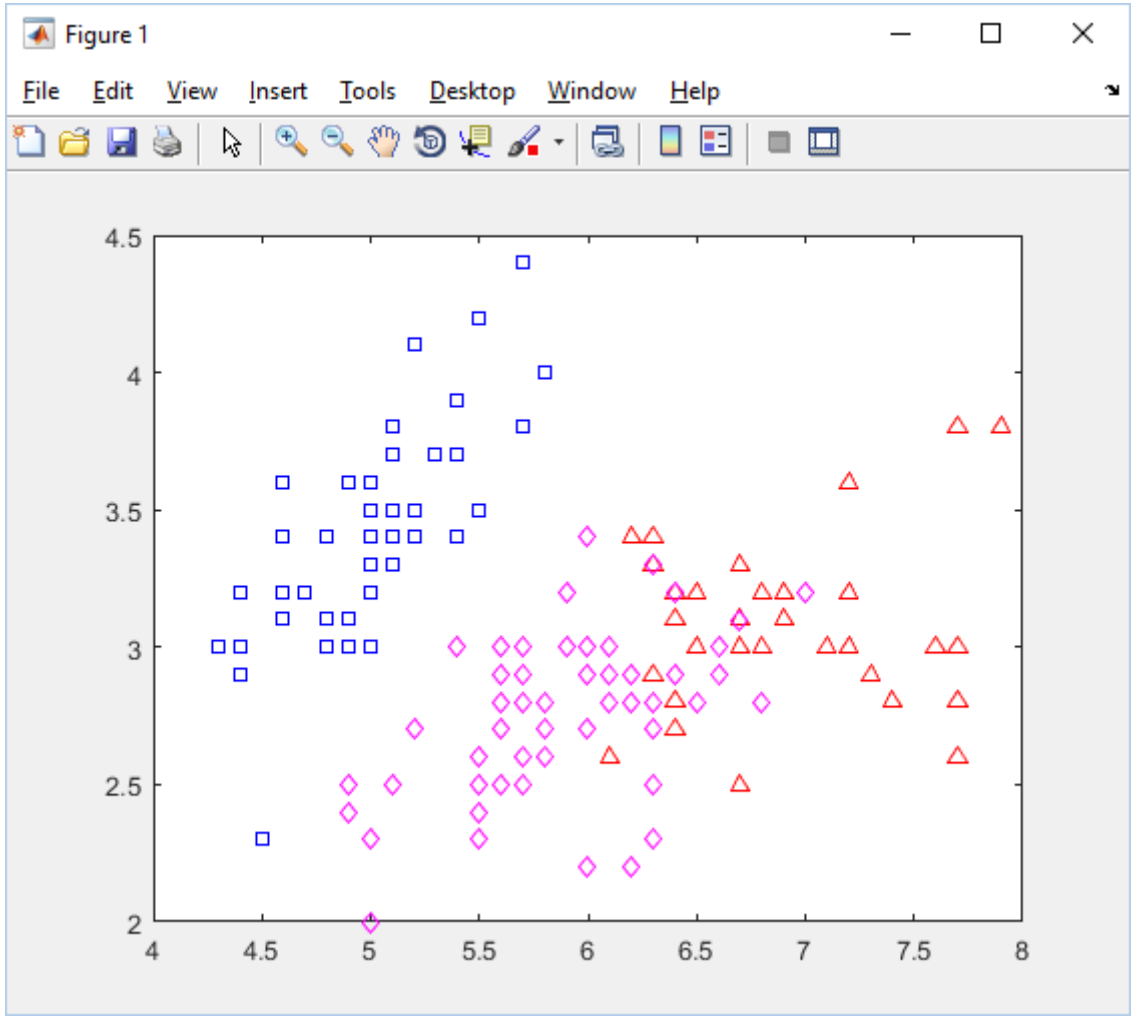
Lab13a.m – Visualize the clustering results

```
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
```



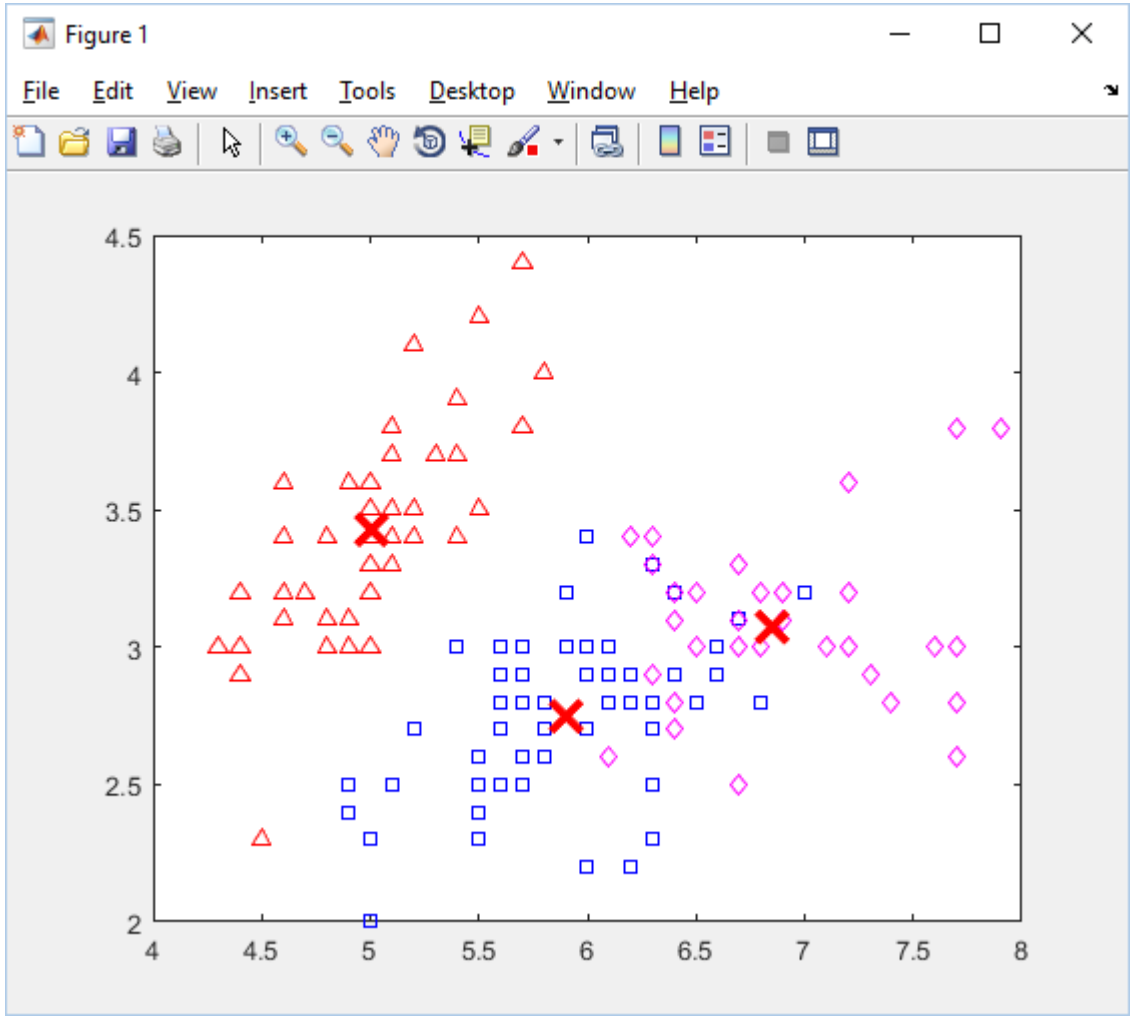
Lab13a.m – Visualize the clustering results

```
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});
    hold on;
end
```



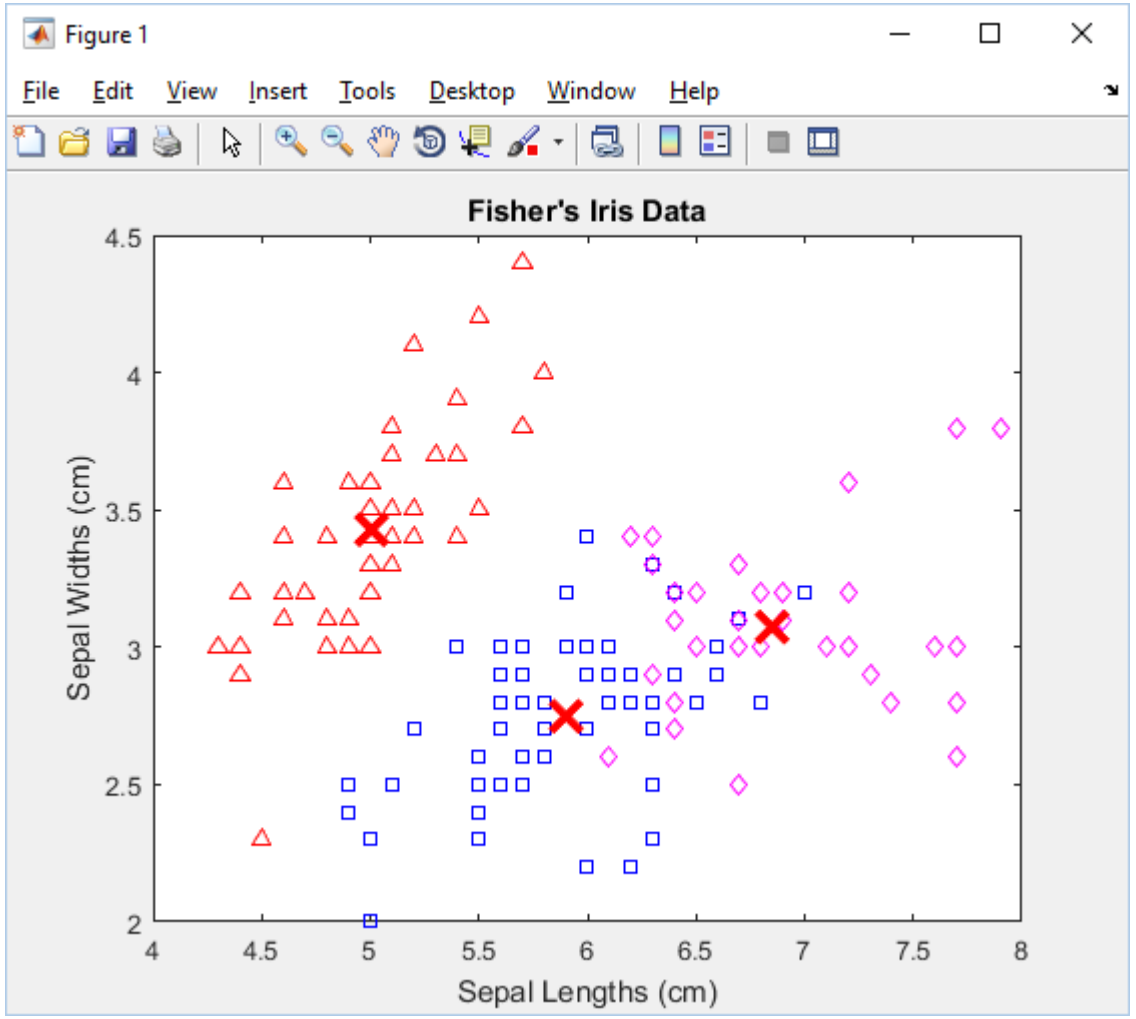
Lab13a.m – Visualize the centroids

```
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);
```

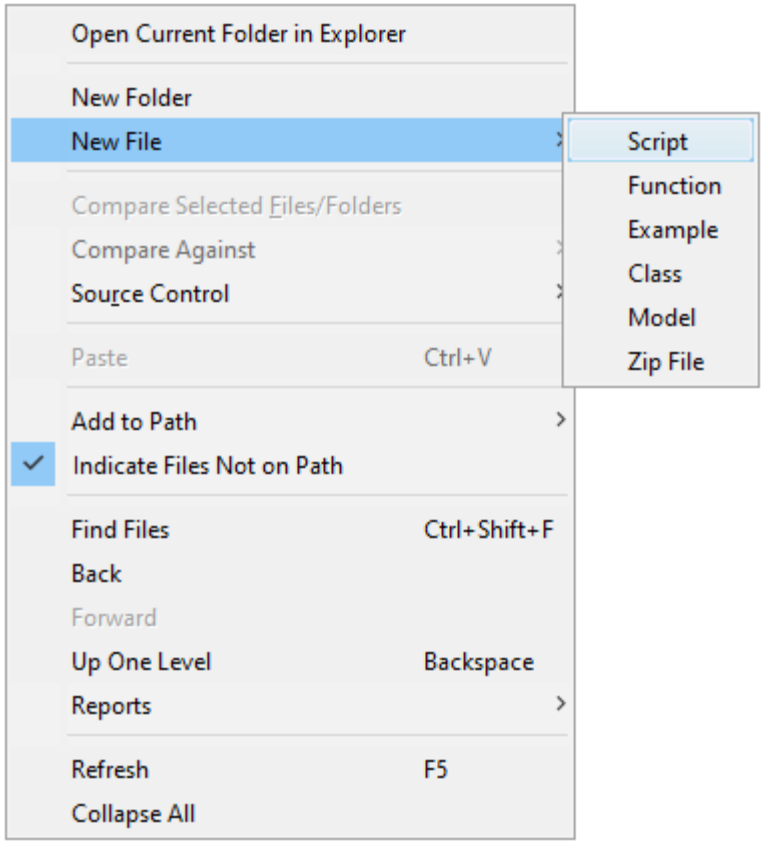


Lab13a.m – Add title and axes

```
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

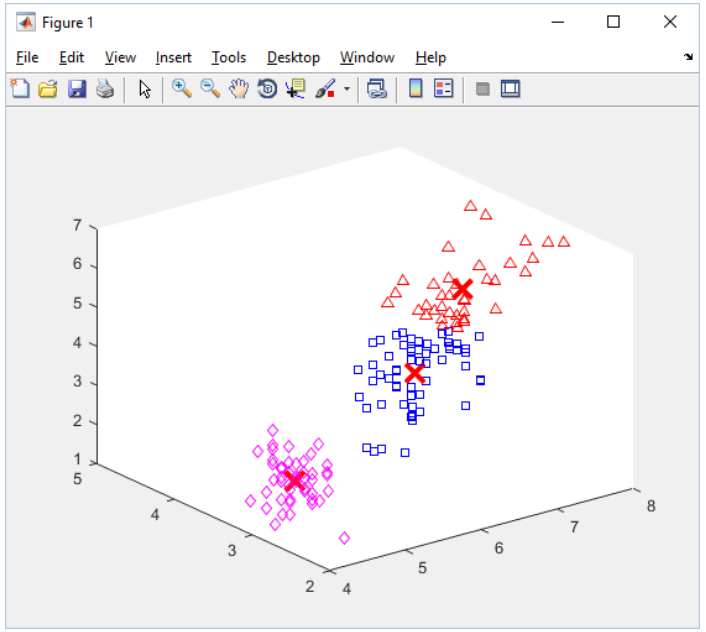
```
close all;
clear all;
clc;
```

Lab13b.m – Prepare data and perform k means

```
close all;
clear all;
clc;

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

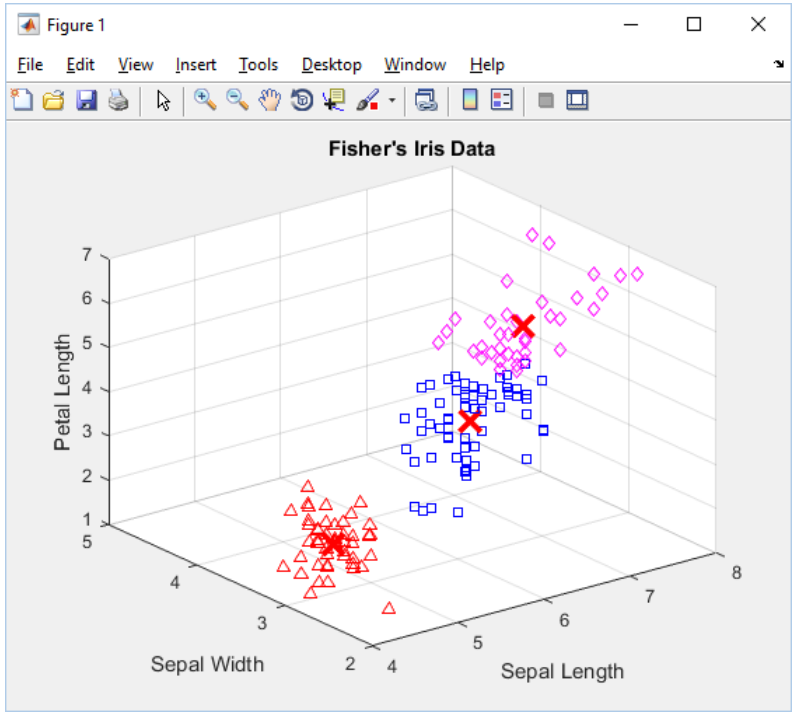
Lab13b.m – Visualize clustering results

```
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
```

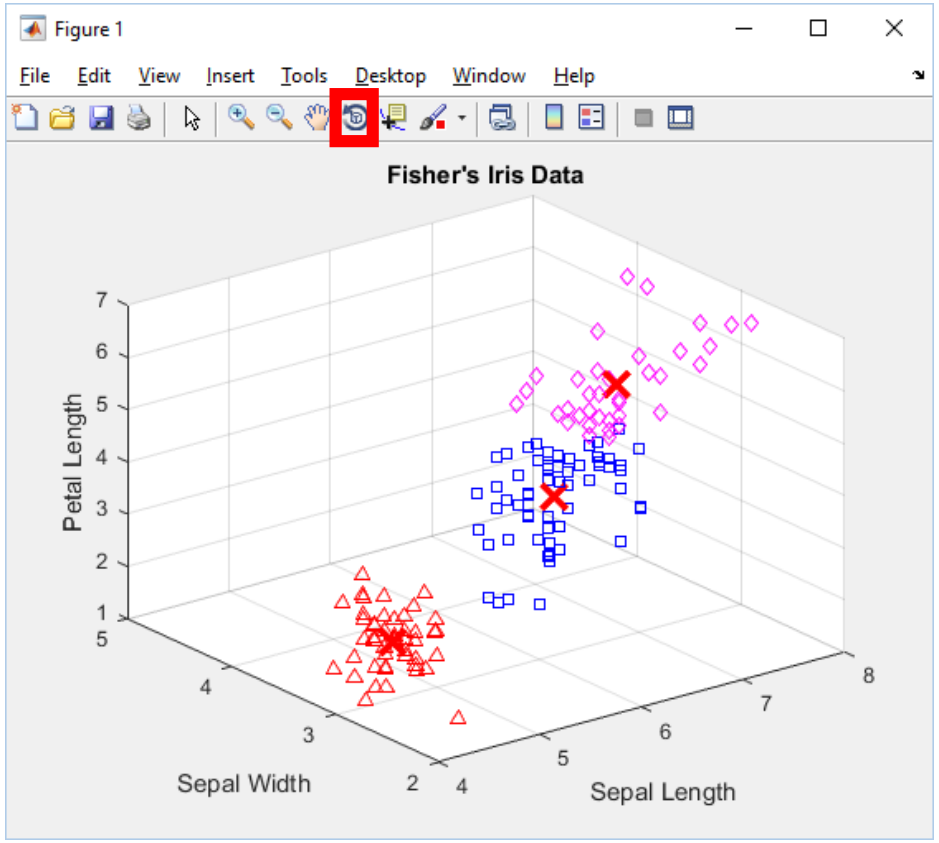


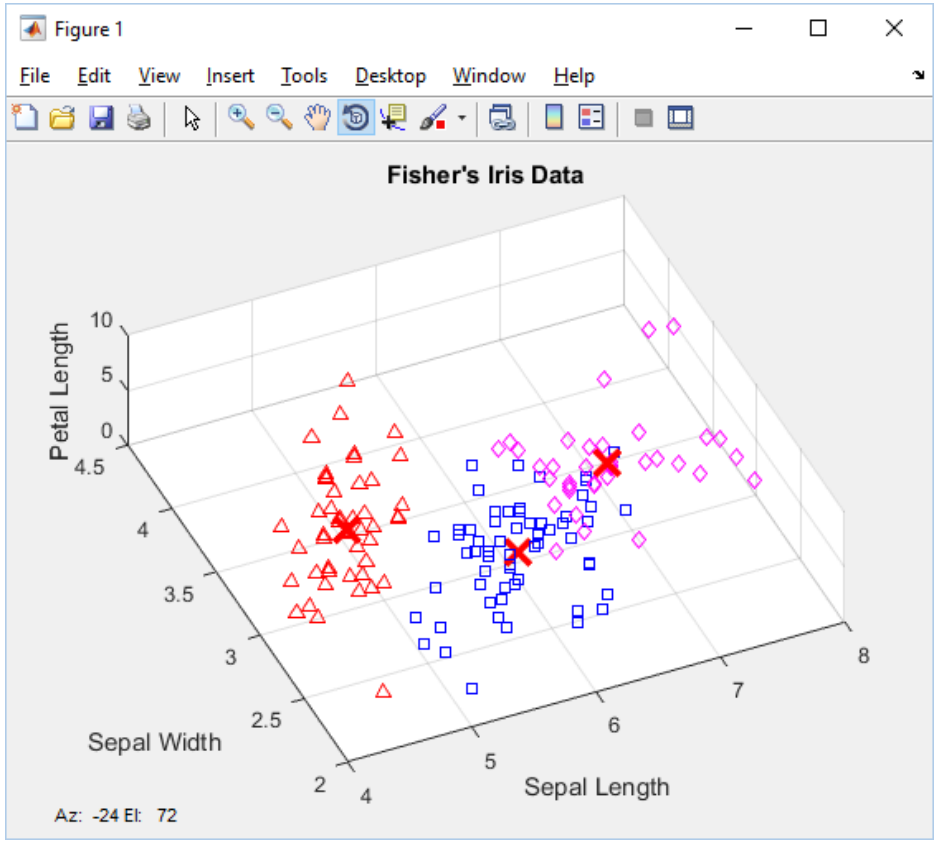
Lab13b.m – Add title, axes and grid

```
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
```

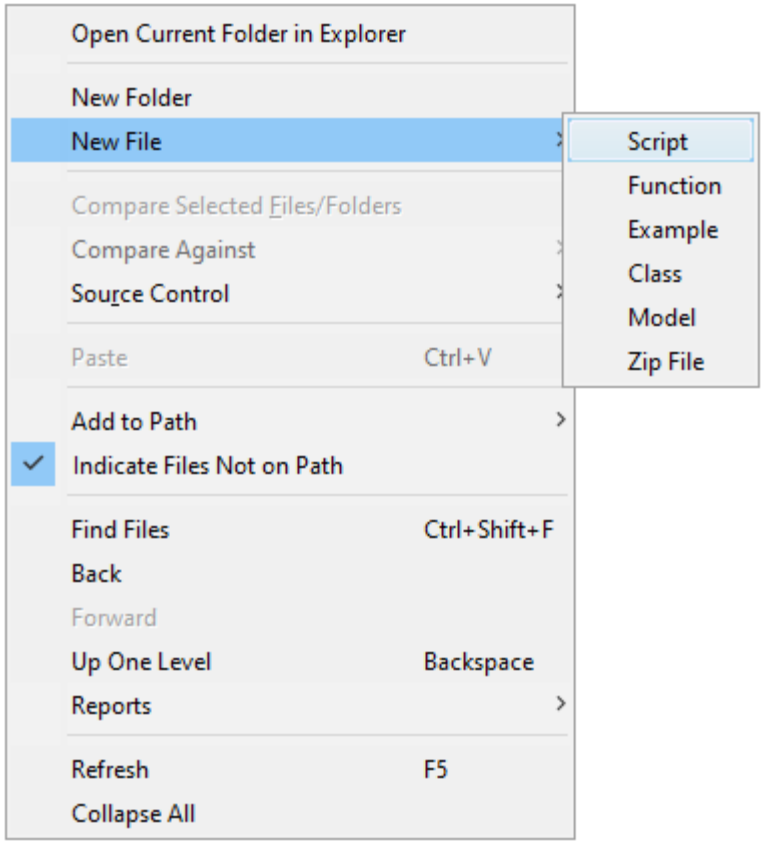


Explore the visualization in 3D





Create new script file: Lab13c.m



Lab13c.m

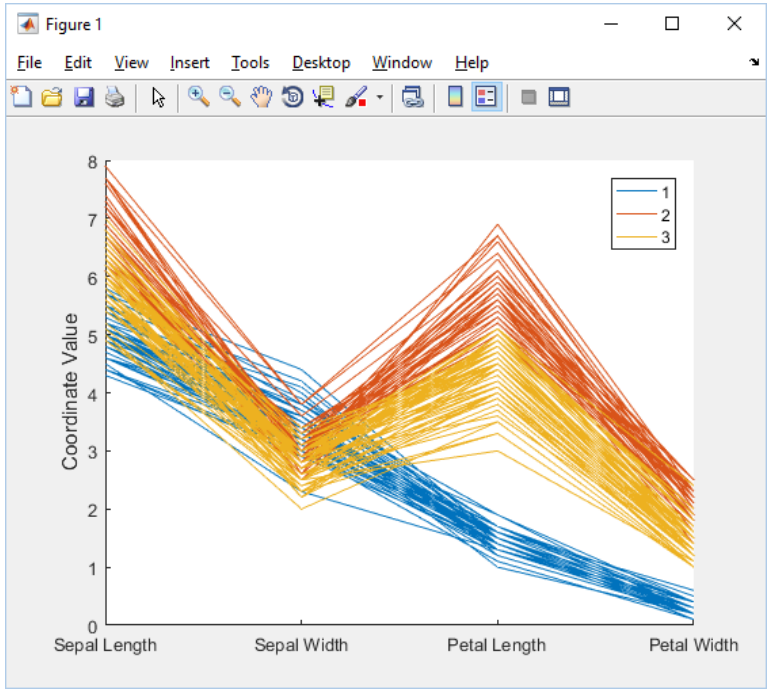
```
close all;
clear all;
clc;
```

Lab13c.m – Prepare data and perform k means

```
close all;
clear all;
clc;

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

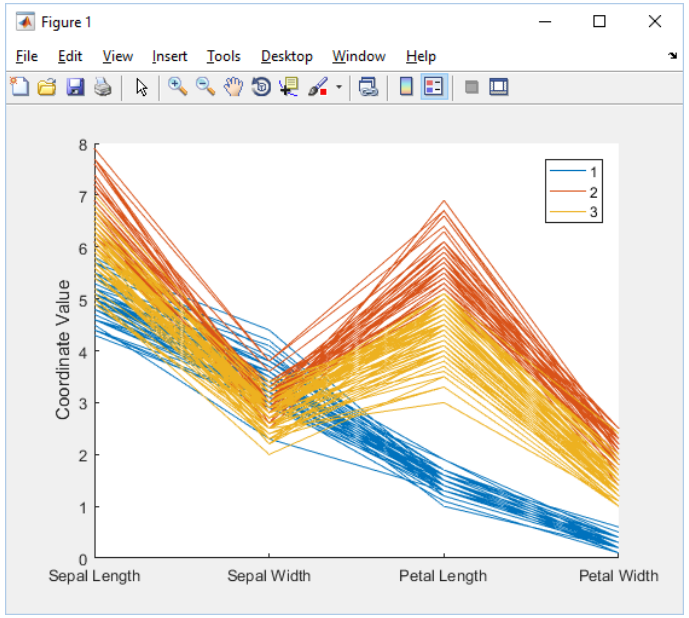
Lab13c.m – Visualize clustered data with PC

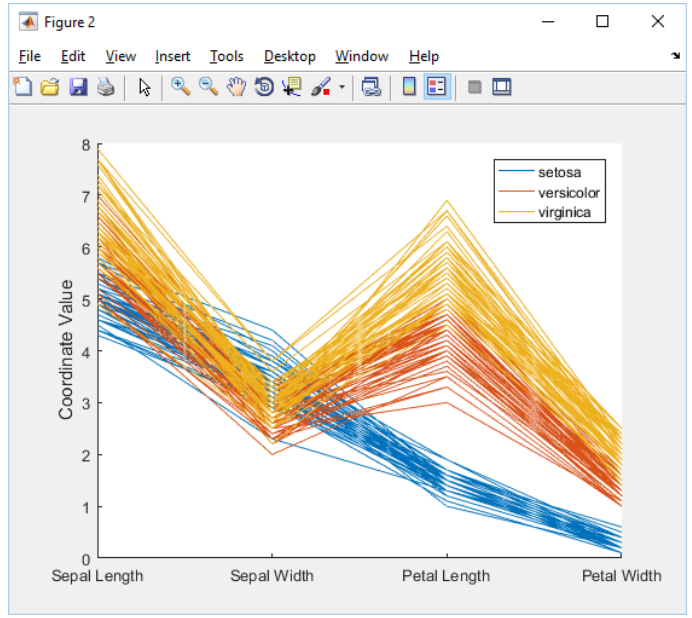
```
close all;
clear all;
clc;

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