Preparation for Assignment 4

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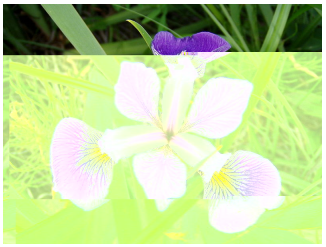
Function handles in MATLAB
Function handles serve as a mean of invoking anonymous functions. An anonymous function is a one-line expression-based MATLAB function that does not require a program file.
For example, the statement

```
mydist = @(x,y) sum((x-y).^2);
```

creates an anonymous function `mydist` that computes the squared Euclidean distance of input arguments `x` and `y`. The `@` operator makes `mydist` a function handle, giving you a means of calling the function:

```
mydist([1 0 1],[0 1 -1])
ans =
   6
```

Linear Discriminant Analysis :
This example shows the linear discriminant classification of the Fisher iris data. In the original paper of Linear Discriminant Analysis from Fisher, the Iris flower data set was used for evaluating the method. The data set consists of 50 samples from each of three species of Iris flower (Iris setosa, Iris virginica and Iris versicolor). Four features were measured from each sample: the length and the width of the sepals and petals, in centimeters. In this example, we want to predict species from these features. To make the demonstration easier, we only use feature 3 (petal length) and feature 4 (petal width).



Load the data:

```
load fisheriris
```

Use the petal length (PL) and petal width (PW) measurements:

```
PL = meas(:,3);
PW = meas(:,4);
```

Plot the data, showing the classification:

```
h1 = gscatter(PL,PW,species,'krb','ov^',[],'off');
set(h1,'LineWidth',2)
legend('Setosa','Versicolor','Virginica',...
       'Location','best')
```

Create a linear classifier:

```
X = [PL,PW];
cls = ClassificationDiscriminant.fit(X,species);
```

Plot the classification boundaries:

```
hold on
K = cls.Coeffs(2,3).Const;
L = cls.Coeffs(2,3).Linear;
% Plot the curve K + [x,y]*L  = 0:
f = @(x1,x2) K + L(1)*x1 + L(2)*x2;
h2 = ezplot(f,[.9 7.1 0 2.5]);
set(h2,'Color','r','LineWidth',2)

K = cls.Coeffs(1,2).Const;
L = cls.Coeffs(1,2).Linear;
% Plot the curve K + [x1,x2]*L  = 0:
f = @(x1,x2) K + L(1)*x1 + L(2)*x2;
h3 = ezplot(f,[.9 7.1 0 2.5]);
set(h3,'Color','k','LineWidth',2)
axis([.9 7.1 0 2.5])
xlabel('Petal Length')
ylabel('Petal Width')
title('{\bf Linear Classification with Fisher Training Data}')
```