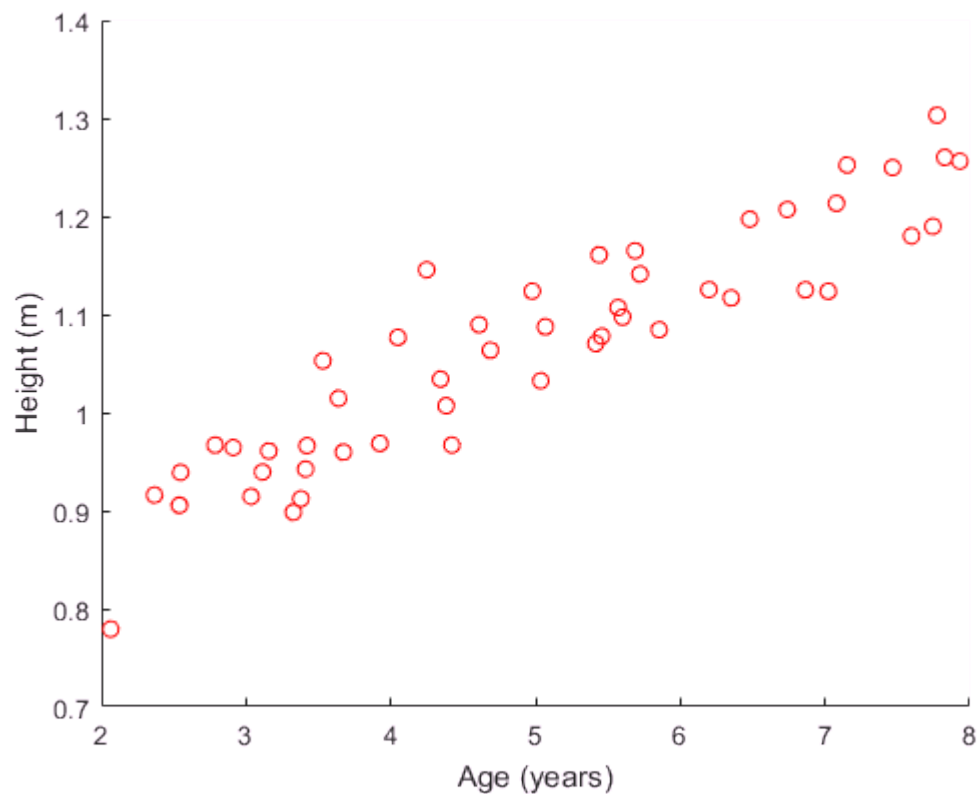


Project 1: Linear Regression

1. Do “Exercise 2: Linear Regression” from Andrew’s Ng’s OpenClassroom online course: <http://openclassroom.stanford.edu/MainFolder/DocumentPage.php?course=MachineLearning&doc=exercises/ex2/ex2.html>

```
% import data
x = load('ex2x.dat');
y = load('ex2y.dat');
```

```
% plot data
hold on
scatter(x,y,'r')
ylabel('Height (m)')
xlabel('Age (years)')
hold off
```



```
% Preprocessing
m = length(y);
x = [ones(m,1), x];
```

Linear regression

```
alpha = 0.07;
```

```

theta = [0,0];
epoch = 1500;

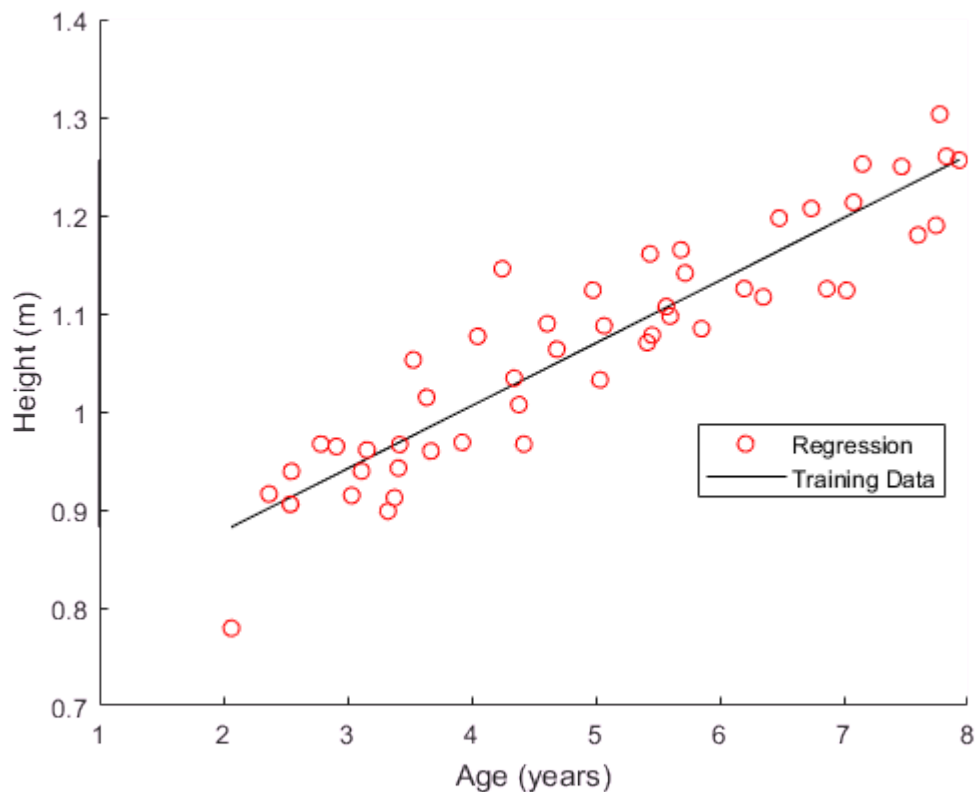
for i = 1:epoch
    theta(i+1,1) = theta(i,1) - (alpha*(1/m)*(sum(((theta(i,:)*x')'-y).*x(:,1))));
    theta(i+1,2) = theta(i,2) - (alpha*(1/m)*(sum(((theta(i,:)*x')'-y).*x(:,2))));
end

```

```

hold on
plot(x,((x(:,2)).*theta(end,2))+theta(end,1)), 'k')
scatter(x(:,2),y, 'r')
xlabel('Age (years)')
ylabel('Height (m)')
legend('Regression', 'Training Data', 'location', 'best')
hold off

```



```
age_3 = (3.5*(theta(end,2))+theta(end,1))
```

```
age_3 = 0.9737
```

```
age_5 = (7*(theta(end,2))+theta(end,1))
```

```
age_5 = 1.1973
```

Understanding $J(\theta)$

```

J_vals = zeros(100, 100); % initialize Jvals to 100x100 matrix of 0's
theta0_vals = linspace(-3, 3, 100);
theta1_vals = linspace(-1, 1, 100);
for i = 1:length(theta0_vals)
    for j = 1:length(theta1_vals)
        J_vals(i,j) = (1/(2*length(x)))...
            *sum((sum((x.*[theta0_vals(i),theta1_vals(j)])-y).^2)));
    end
end

```

```

J_vals = J_vals';
figure;
contour3(theta0_vals, theta1_vals, J_vals,100)
xlabel('\theta_0')
ylabel('\theta_1')
zlabel('J_{\theta}')

```

