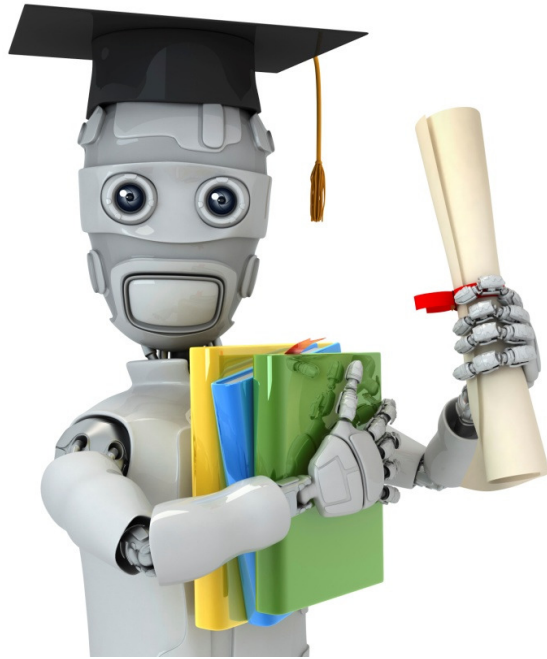# Octave Tutorial

Basic operations

Machine Learning

Octave Tutorial

Moving data around

Machine Learning

Machine Learning

Octave Tutorial

Computing on data

Octave Tutorial

Plotting data

Machine Learning

Octave Tutorial
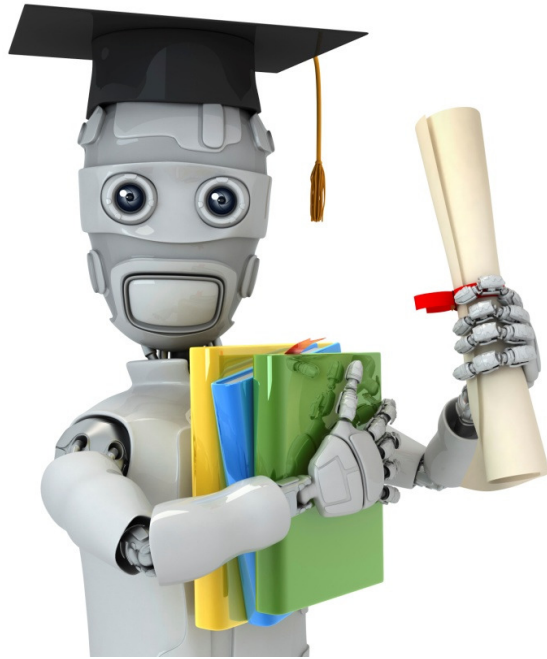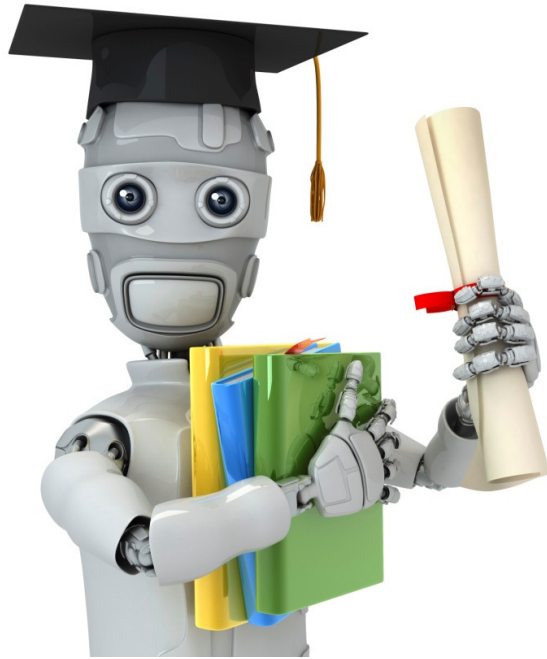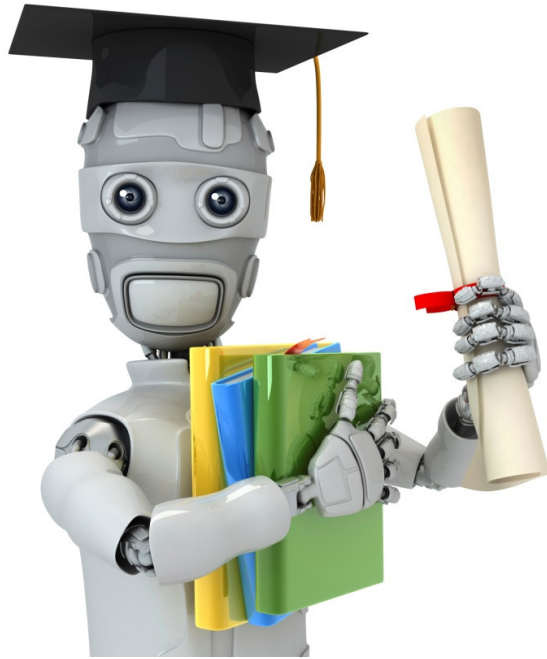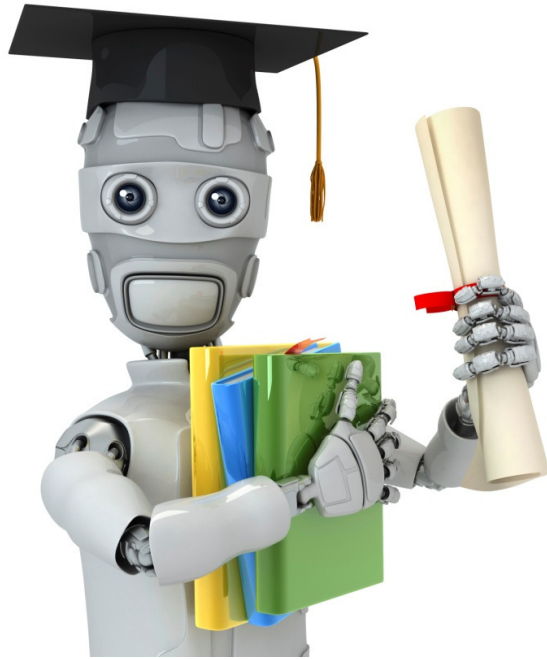
Control statements: for, while, if statements

Machine Learning

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Vectorial implementation

Machine Learning

Vectorization example.

$$h_\theta(x) = \sum_{j=\theta}^{n} \theta_j x_j$$

$$= \theta^T x$$

Unvectorized implementation

```
prediction = 0.0;
for j = 1:n+1,
  prediction = prediction +
            theta(j) * x(y)
end;
```

Vectorized implementation

```
prediction = theta' * x;
```

Vectorization example.

$$h_\theta(x) = \sum_{j=\theta}^{n} \theta_j x_j$$

$$= \theta^T x$$

Unvectorized implementation

```
double prediction = 0.0;
for (int j = 0; j < n; j++)
  prediction += theta[j] * x[y];
```

Vectorized implementation

```
double prediction
  = theta.transpose() * x;
```

Gradient descent

$$\theta_j := \theta_j - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_j^{(i)} \qquad \text{(for all } j\text{)}$$

$$\theta_0 := \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_0^{(i)}$$

$$\theta_1 := \theta_1 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_1^{(i)}$$

$$\theta_2 := \theta_2 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)}) x_2^{(i)}$$

$$\theta_0 := \theta_0 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)})x_0^{(i)}$$

$$\theta_1 := \theta_1 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)})x_1^{(i)}$$

$$\theta_2 := \theta_2 - \alpha \frac{1}{m} \sum_{i=1}^{m} (h_\theta(x^{(i)}) - y^{(i)})x_2^{(i)}$$

$$(n = 2)$$

$$u(j) = 2v(j) + 5w(j) \quad \text{(for all } j\text{)}$$

$$u = 2v + 5w$$