Implementation Note: Unrolling Parameters

With neural networks, we are working with sets of matrices:

```
egin{aligned} \Theta^{(1)}, \Theta^{(2)}, \Theta^{(3)}, \ldots \ D^{(1)}, D^{(2)}, D^{(3)}, \ldots \end{aligned}
```

In order to use optimizing functions such as "fminunc()", we will want to "unroll" all the elements and put them into one long vector:

```
1 thetaVector = [ Theta1(:); Theta2(:); Theta3(:); ]
2 deltaVector = [ D1(:); D2(:); D3(:) ]
```

If the dimensions of Theta1 is 10x11, Theta2 is 10x11 and Theta3 is 1x11, then we can get back our original matrices from the "unrolled" versions as follows:

```
1 Theta1 = reshape(thetaVector(1:110),10,11)
2 Theta2 = reshape(thetaVector(111:220),10,11)
3 Theta3 = reshape(thetaVector(221:231),1,11)
4
```

To summarize:

Learning Algorithm

- \rightarrow Have initial parameters $\Theta^{(1)}, \Theta^{(2)}, \Theta^{(3)}$.
- → Unroll to get initialTheta to pass to
- → fminunc(@costFunction, initialTheta, options)

```
function [jval, gradientVec] = costFunction (thetaVec) From thetaVec, get \Theta^{(1)}, \Theta^{(2)}, \Theta^{(3)}. Use forward prop/back prop to compute D^{(1)}, D^{(2)}, D^{(3)} and J(\Theta). Unroll D^{(1)}, D^{(2)}, D^{(3)} to get gradientVec.
```

✓ Complete

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