week4_code

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partial codes in week_3 code assignment.

> written by *VincentX3*, Nov.13.18

###lrCostFunction.m

```
z=X*theta;
h=sigmoid(z);
reg=(lambda/(2*m))*((theta'*theta)-theta(1)*theta(1));
J=1/m*(-y'*log(h)-(1-y')*log(1-h))+reg;
mask=theta;
mask(1)=0;
grad=1/m*X'*(h-y)+(lambda/m).*mask;
```

the same as last week regularization.

oneVsAll.m

```
      % Set Initial theta
    initial_theta = zeros(n + 1, 1);

for loop_num=1:num_labels
     % Set options for fminunc
     options = optimset('GradObj', 'on', 'MaxIter', 50);
     % Run fmincg to obtain the optimal theta
     % This function will return theta and the cost
     [tmp_theta] = ...
         fmincg (@(t)(lrCostFunction(t, X, (y==loop_num), lambda)), ...
                 initial_theta, options);
     all_theta(loop_num,:)=tmp_theta';

end
```

use `fmincg` which provided by teacher.
remember that we are using oneVsAll strategy, so we implement a loop through 1:10 (trick: use 10 indicate '0') to compute each circumstance.
before mix to `all_theta` , the one of ten theta we got should be **transpose**

predictOneVsAll.m

```
h=sigmoid(X*all_theta');
[data,index]=max(h,[],2);
p=index;
```

use `max()` to get index of hypothesis. (the index denote the written digit)

predict.m

```
%add xzero column
X=[ones(m,1) X];

z_one=X*Theta1';
a_two=sigmoid(z_one);

%add azero column
a_two=[ones(size(a_two,1),1) a_two];
z_two=a_two*Theta2';
h=sigmoid(z_two);
[val p]=max(h,[],2);
```

by using the already trained theta, we can implement neural network to predict our data set.
Remember the a's row number should always equals to m (here m==5000), which is the number of our training examples.

Be caution, the accuracy we got here is actually inaccurate. Because we got it from training set.
However, we should divide data set into training one and testing one. The accuracy should come from the prediction implement on testing set.