\begin{homeworkProblem}

Input of the model is a 2D matrix, where row size is the number of headlines words, and column size is total headlines size. Output of the model is a n by 1 vector.

\\

Learning rate: 0.1\\

Cost function: Cross-entropy\\

Regularization term: 3e-4,1e-3,3e-3,1e-2,3e-2,1e-1 were tested and 3e-3 was the optimal choice\\

\begin{figure\*}[!ht]

\centering

\includegraphics[scale = 0.7 ]{learning\_curve\_part4\_.png}

\caption{Learning curve}

\label{fig:learning curve(part4)}

\end{figure\*}

Accuracy of each set:\\

Training set accuracy 0.733595800525\\

Validation set accuracy 0.69387755102\\

Testing set accuracy 0.715015321757\\

The cost function of the model we use is:

$$-\sum\_j(y\_jlog(\theta^TX\_j)+(1-y\_j)log(1-\theta^TX\_j)) + \lambda \Vert \theta^2 \Vert$$

\begin{figure\*}[!ht]

\centering

\includegraphics[scale = 0.7 ]{tuned\_parameter\_part4\_.png}

\caption{Validation set accuracy with respect to various regularization parameter}

\label{fig:tuning parameter(part4)}

\end{figure\*}

As is stated, 3e-3 got the best performance.

\end{homeworkProblem}

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