Deep Learning Assignment - 4

Submitted By: Pranshu Shrivastava

1:

Code can be found in the attached python notebook.

2.1:

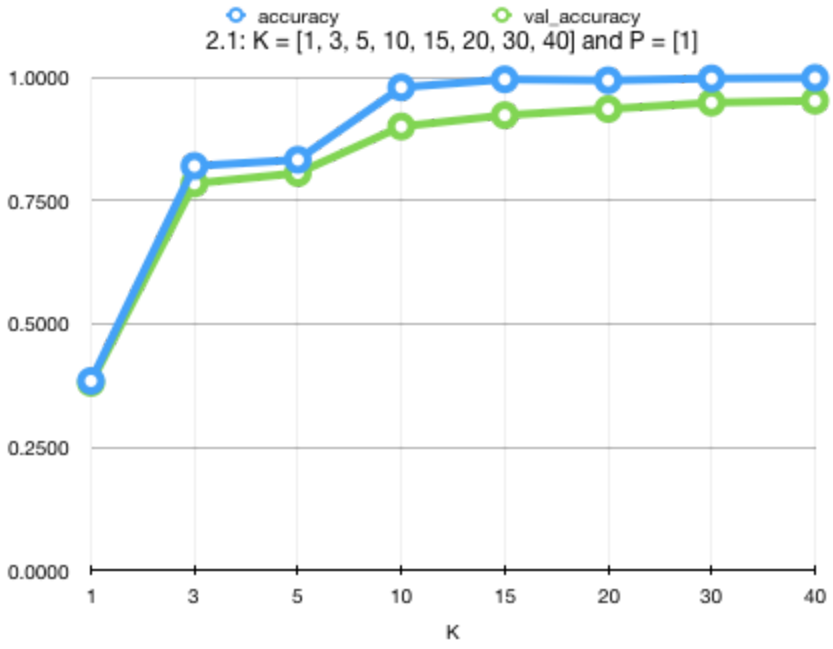
With no dropout regularization, i.e. P = 1. A plot of training and test accuracy for K = 1, 3, 5, 10, 15, 20, 30, 40.

Q: As k increases, does the performance improve?

As seen from the plot below, accuracy increases with increasing values of K until a point where it converges.

Q: At what k, training accuracy becomes 100%?

Training accuracy reaches 100% at K = 15.



2.2:

Q: What is the role of P on training accuracy?

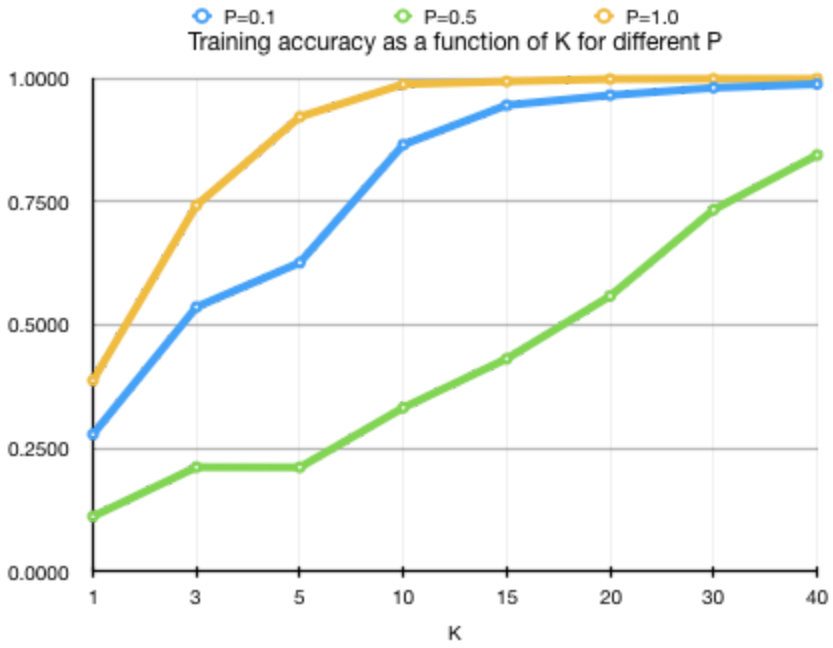
For P = 1, the training accuracy converges at a lower value of K while for P = 0.5, the convergence is the most delayed.

Q: When P is smaller, is it easier to optimize or more difficult?

It is easier to optimize for smaller P.

Q: For each choice of P, determine at what choice of K, training accuracy becomes 100%.

For P = 1, accuracy becomes 100% at K = 10
For P = 0.1, accuracy becomes 100% at K = 40
For P = 0.5, training accuracy doesn't reach 100% for the implemented model running 80 epochs.



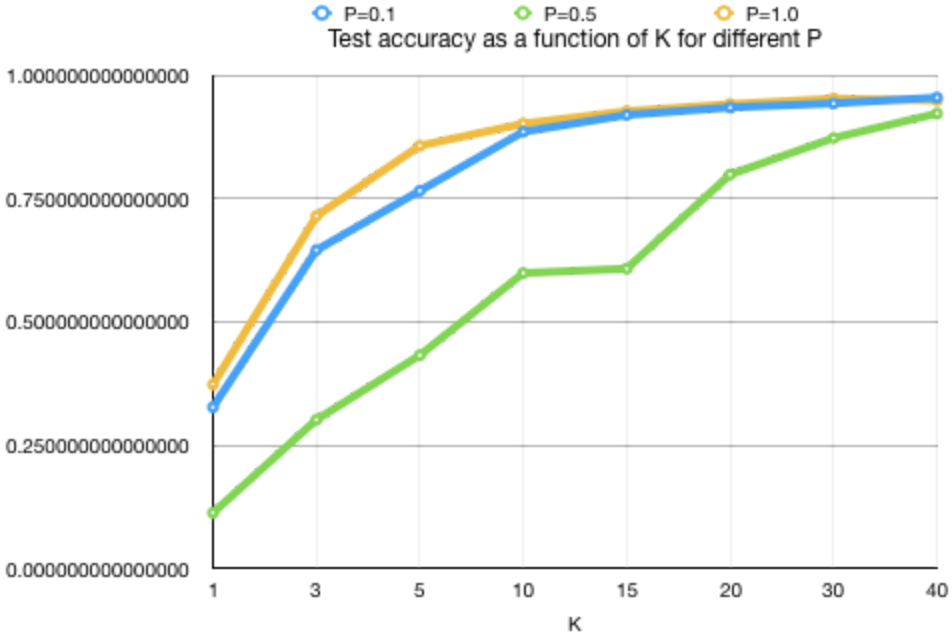
2.3:

Q: Does dropout help with the test accuracy?

Dropout helps with the test accuracy as the highest accuracy is seen at P=0.1, i.e. 95.469% at K=40 but this can't be said for lower values of K for which accuracy is higher at P=1.

Q: For which (K,P) configuration do you achieve the best test accuracy?

The best test accuracy is obtained at K=40 and P=0.1, i.e. 95.469%



3.1:

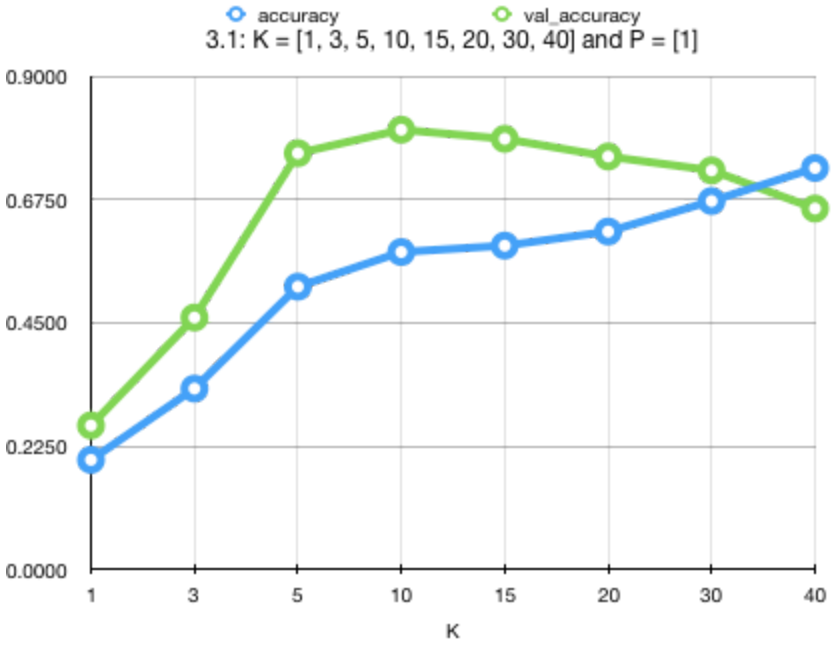
With no dropout regularization, i.e. P = 1. A plot of training and test accuracy for K = 1, 3, 5, 10, 15, 20, 30, 40.

Q: As k increases, does the performance improve?

As seen from the plot below, training accuracy keeps on increasing with increasing values of K while test accuracy increases to a certain point after which it starts decreasing.

Q: At what k, training accuracy becomes 100%?

For these values of K running 80 epochs, training accuracy doesn't reach 100%.



3.2:

Q: What is the role of P on training accuracy?

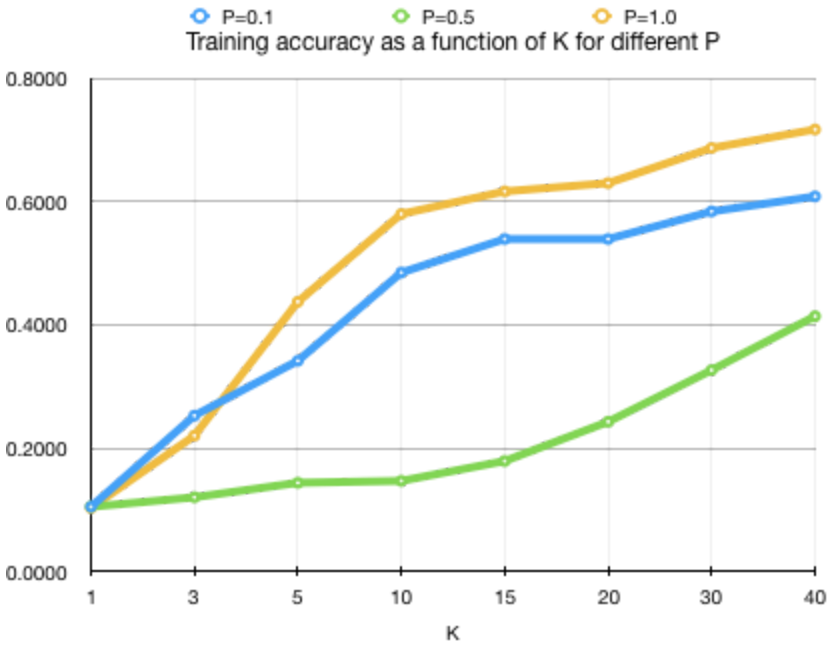
For P = 1, the best training accuracy can be noted while for P = 0.5, it is the least.

Q: When P is smaller, is it easier to optimize or more difficult?

It is easier to optimize for smaller P.

Q: For each choice of P, determine at what choice of K, training accuracy becomes 100%.

For P = 1, training accuracy doesn't reach 100% for the implemented model.
For P = 0.1, training accuracy doesn't reach 100% for the implemented model.
For P = 0.5, training accuracy doesn't reach 100% for the implemented model.



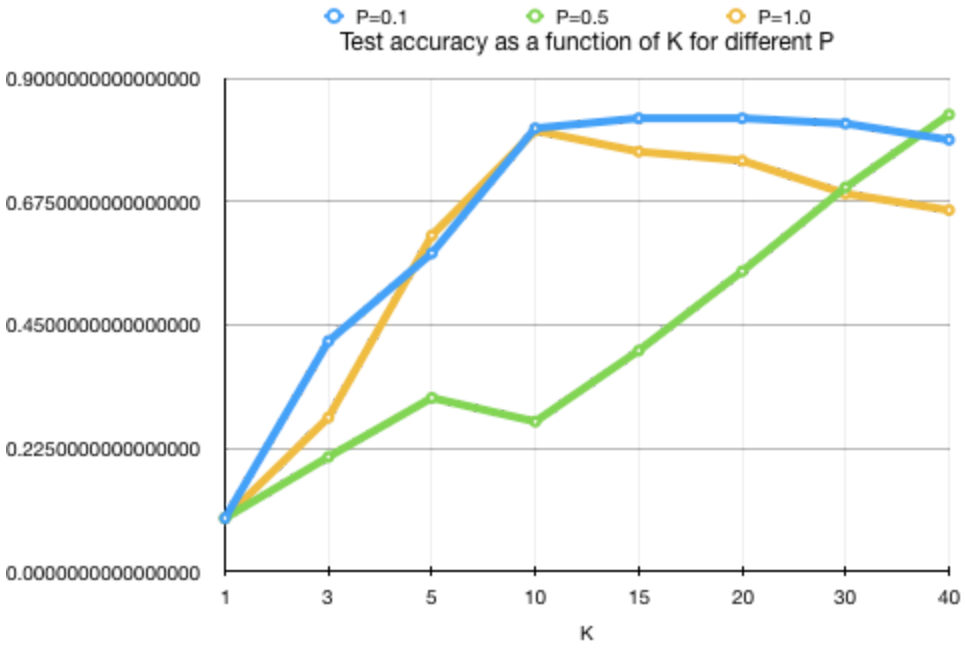
3.3:

Q: Does dropout help with the test accuracy?

Dropout helps with the test accuracy as the highest accuracy is seen at P=0.5, i.e. 83.359% at K=40.

Q: For which (K,P) configuration do you achieve the best test accuracy?

The best test accuracy is obtained at K=40 and P=0.5, i.e. 83.359%



4:

Q: Comment on the differences between Step 2 and Step 3.

In step 3, it can be noted that for lower values of K, training accuracy is lower than test accuracy which gradually surpases for larger K while this wasn't the case for step-2.
Dropout seems to be more effective in step-3 than in step-2.

Q: How does noise change things?

Noise had a drastic reduction on both training and test accuracies.

Q: For which setup dropout is more useful?

For larger values of K, dropout is much more useful for step-3, i.e. with noise. P=0.1 provided the best accuracy for lower values of K while P=0.5 provided the best accuracy for larger K. Overall, P=0.1 showed a good behaviour for varying K.