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REPORT

Table giving details about model, parameters and test accuracy

S. No	Model	Parameters	Test Accuracy
1	Baseline Model	[(64,2),(32,2),(0.3,0.3)]	0.9074000120162964
2	Model 1 - Modified filter 1	[(32,2),(32,2),(0.3,0.3)]	0.90420001745224
3	Model 2 - Modified filter 2	[(32,2),(16,2),(0.3,0.3)]	0.897300004959106
4	Model 3 - Modified Kernel 1	[(64,3),(32,3),(0.3,0.3)]	0.912800014019013
5	Model 4- Modified Kernel 2	[(64,5),(32,5),(0.3,0.3)]	0.915199995040894
6	Model 5 - Modified Dropout 1	[(64,2),(32,2),(0.35,0.25)]	0.910799980163574
7	Model 6 - Modified Dropout 2	[(64,2),(32,2),(0.2,0.2)]	0.913999974727631
8	Model 7 - Extra layer 1	[(64,2),(32,2),(32,2),(16,2),(0.3,0.3,0.25,0.25)]	0.847500026226044
9	Model 8 - Extra Layer 2	[(64,2),(32,2)(16,2),(16,2),(0.3,0.3,0.25,0.25)]	0.80460000038147
10	Model 9 - Modified parameters 1	[(32,4),(32,4),(0.25,0.25)] Pool : (2,2)	0.915600001811981
11	Model 10 -Modified parameters 2	[(32,5),(32,5),(0.3,0.3)] Pool : (3,2)	0.902800023555756
12	Model 11 - Modified parameters 3	[(64,4),(64,2),(0.4,0.3)] Pool : (4,2)	0.90149998664856
13	Model 14 - Modified parameters 4	[(64,5),(64,5),(0.25,0.3)] Pool : (3,3)	0.911700010299683

REPORT
Baseline model : [(64,2),(32,2),(0.3,0.3)]
Accuracy in baseline model : 0.9074000120162964

Model 1 : Modified Filter 1
In model 1, we are changing filter from 64 in baseline model to 32.

Accuracy in Model 1 : 0.90420001745224

Observation : Accuracy has gone up from 0.9074000120162964 to 0.90420001745224. There is slight improvement. This is because the filter size has increased and this helps in extracting features more effectively hence the accuracy has increased.

Model 2 : Modified Filter 2
In model 2, we are changing filter from 32 in baseline model to 16.

Accuracy in Model 2 : 0.897300004959106

Observation : Accuracy has gone down from 0.9074000120162964 to 0.897300004959106. The model is performing poorly compared to the baseline model. This might be because we decreased the number of filters hence the numbers of parameters is less and the fitting might not be up to the mark.
Comparing this to Model 1 we can observe that the accuracy has gone done further. This is because the number of filters is less in Model 2 compared to Model 1. As the number of filters decrease, feature extraction becomes less efficient.

Model 3 : Modified kernel 1
In model 3, we are changing kernels from 2 to 3.

Accuracy in Model 3 : 0.912800014019013

Observation : Accuracy has gone up from 0.9074000120162964 to 0.912800014019013. As the number of kernels was increased from 2 to 3, the number of parameters also increased making the network more complex and thus increasing the accuracy.

Model 4 : Modified kernel 2
In model 4, we are changing kernels from 2 to 5

Accuracy in Model 4 : 0.915199995040894

Observations : Accuracy has gone up from 0.9074000120162964 to 0.915199995040894. The number of kernels has increased from 2 to 5 the model is extracting more features and thus lowering classification error.

Model 4 has higher accuracy than model 3 because the number of kernels in Model 4 is the highest among baseline model, Model 3 and Model 4.

Model 5 : Modified dropout 1
In model 5, we are changing the dropout from (0.3,0.3) to (0.35,0.25)

Accuracy in Model 5 : 0.910799980163574

Observations : Accuracy has gone up from 0.9074000120162964 to 0.910799980163574. That is, there is approximately 0.3% increase in accuracy.

Model 6 : Modified dropout 2
In model 6, we are changing the dropout from (0.3,0.3) to (0.2,0.2)

Accuracy in Model 6 : 0.913999974727631

Observations: Accuracy has gone up from 0.9074000120162964 to 0.913999974727631. This is because the dropout is less hence more tensors

are being dropped. Therefore, the accuracy has dropped compared to the baseline model.

Model 7 : Adding extra layer 1
In model 7, we are adding extra layer [(64,2),(32,2),(32,2),(16,2), (0.3,0.3,0.25,0.25)].

Accuracy in model 7 : 0.847500026226044

Observations : Accuracy has gone up from 0.9074000120162964 to 0.913999974727631.

Adding extra layer without adequate amount of training data can lead to overfitting. This means that the prediction is good for train data but when it comes to test data the prediction will not be as effective.

The model is performing poorly compared to baseline model and all previous models. In a nutshell, we can say that adding extra layer should not be done in this case.

Model 8 : Adding extra layer 2
In model 8, we are adding adding extra layer [(64,2),(32,2)(16,2),(16,2), (0.3,0.3,0.25,0.25)]

Accuracy in model 8 : 0.80460000038147

Observations : Accuracy has gone down from 0.9074000120162964 to 0.80460000038147. This accuracy is lowest among all the models.

When we compare it to Model 7 we can observe that the accuracy has decreased further because the filter in one of the layers has gone down from 32 to 16.

This means that the model is under fitting and thus performing very poorly.

Model 9 : Modified parameters 1
In model 9, we are changing the all parameters from [(64,2),(32,2), (0.3,0.3)] to [(32,4),(32,4),(0.25,0.25)] and Pool : (2,2)

Accuracy in Model 9: 0.915600001811981

Observation : Accuracy has gone up from 0.9074000120162964 to 0.915600001811981. This is by far the best model.

Even though numbers of filter is less in Model 9 compared to Model 1, the kernel size is bigger which helps in reducing loss.

Model 10 : Modified parameters 2
In model 10, we are changing all the parameters from [(64,2),(32,2), (0.3,0.3)] to [(32,5),(32,5),(0.3,0.3)]and Pool : (3,2)

Accuracy in Model 10: 0.902800023555756

Observation : Accuracy has gone down slightly up from 0.9074000120162964 to 0.902800023555756.

This might caused by decrease in filter size combined with increase in pooling size.

Model 11 : Modified parameters 3
In model 11, we are changing all the parameters from [(64,2),(32,2),
(0.3,0.3)] to [(64,4),(64,2),(0.4,0.3)] and Pool : (4,2)

Accuracy in Model 11 : 0.90149998664856

Observation : Accuracy has gone down slightly up from 0.9074000120162964
to 0.90149998664856.

It can observed that even though the filter size and kernel size have
increased the accuracy has gone down. This is because the drop out is 0.4
and 0.3 which is higher than most of the models.

Thus, the number of tensors being dropped is more which decreases the
accuracy rate.

Model 12 : Modified parameters 4
In model 12, we are changing all the parameters from [(64,2),(32,2),
(0.3,0.3)] to [(64,5),(64,5),(0.25,0.3)] and Pool : (3,3)

Accuracy in Model 12: 0.911700010299683

Observation Accuracy has gone up from 0.9074000120162964 to
0.911700010299683. This can explained by the increased filter size and
kernel size along with decreased pooling.

Even though this model is performing well, it is not as good as Model 9.

CONCLUSION

The model that performs the best and the worst have been highlighted in
the table. From the test accuracies, we can conclude that the model with
an added extra layer performs the worst(Model 8 - highlighted as yellow).
This is because adding the extra layer is leading to overfitting and thus
the model is well-suited for train data but performs poorly for test
data.

The model that performs the best is model 9 with a test accuracy of
approximately 91% (highlighted as green in the table). In this model, one
of the filters(64) is less than that of baseline model (32) and dropout
is also slightly lesser than the baseline model.

For this data, we can choose to go ahead with model 9.