HW 2-REPORT

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Figure 1:
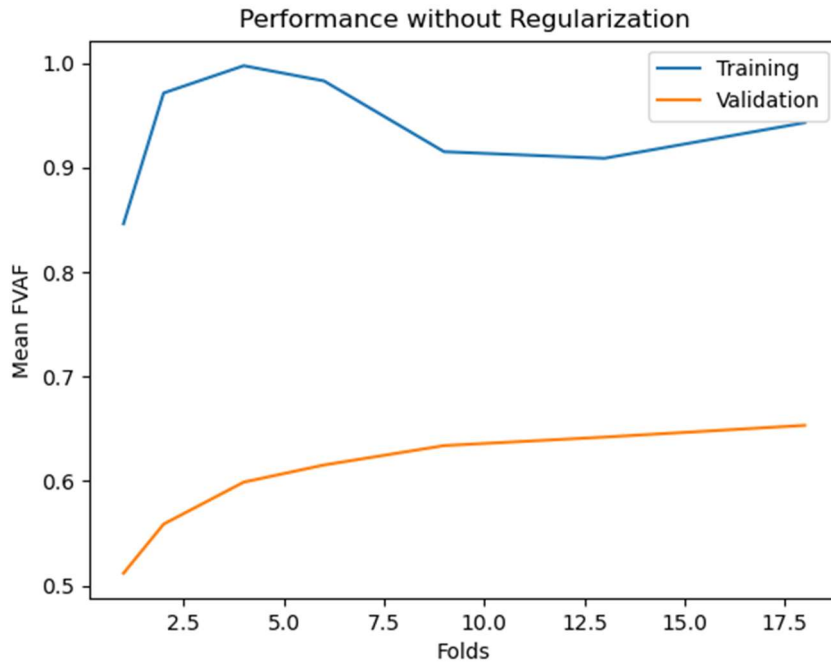

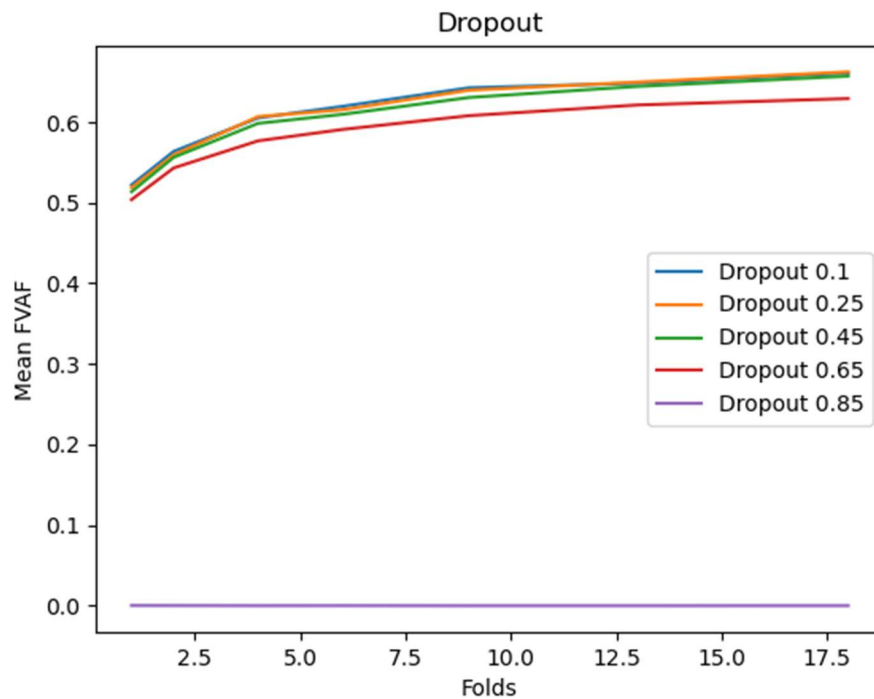Figure 2:

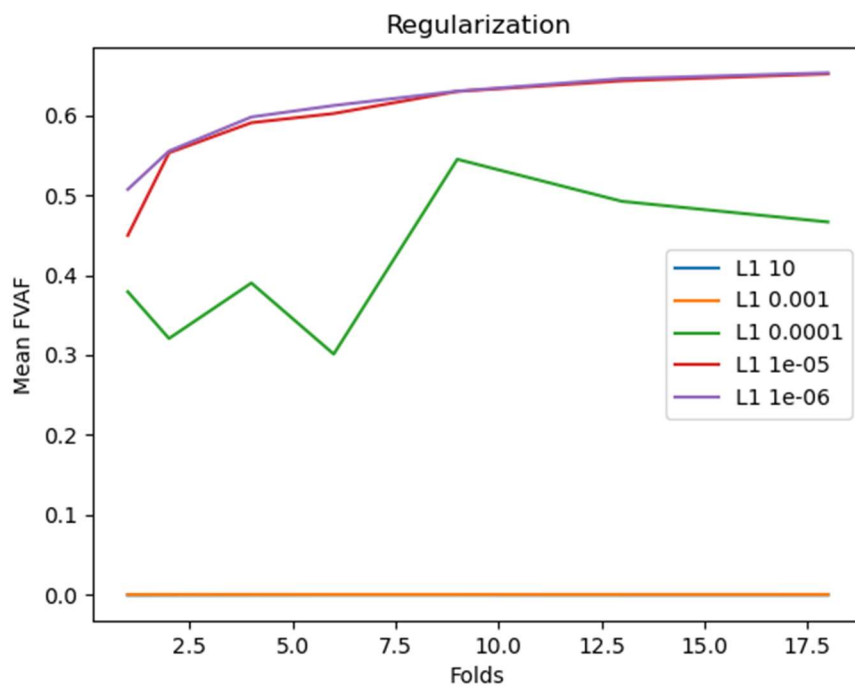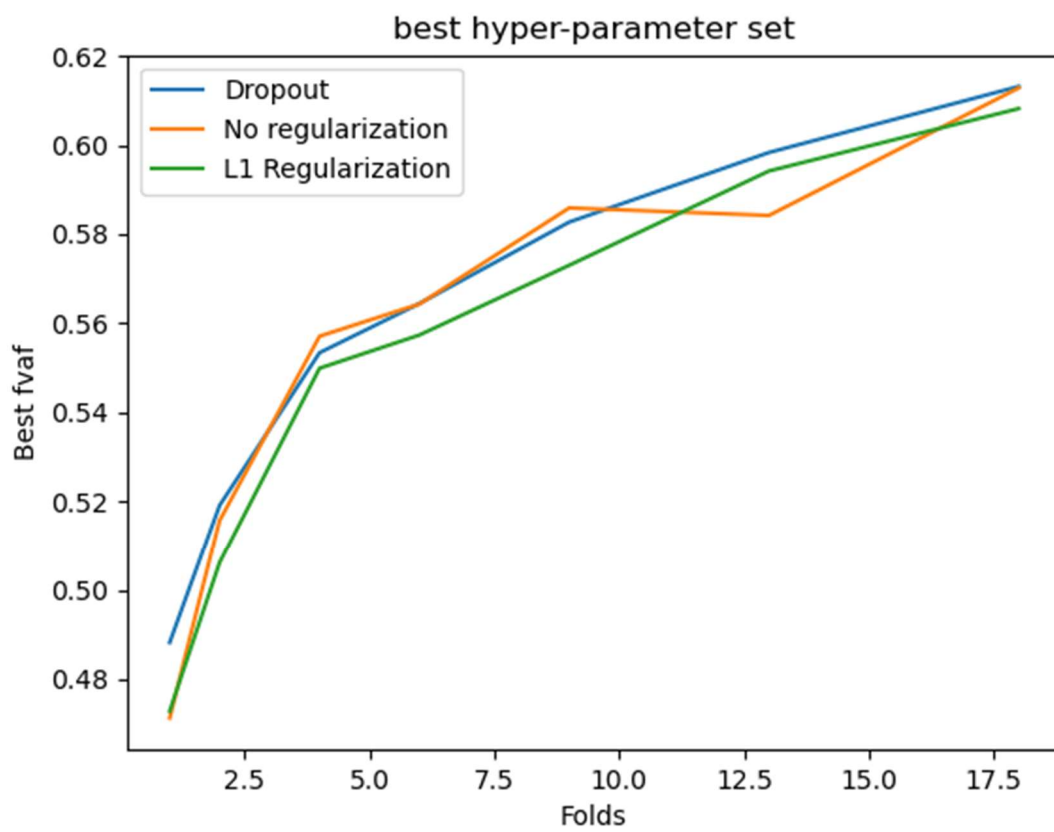Figure 3:

Figure 4:

T-Tests:

For training set size 1

1) T-test between without-regularization and with-dropout:

   TtestResult(statistic=array([-1.2903372]), pvalue=array([0.22909701]), df=array([9]))

   Differences in means is: -0.009764348381517629

2) T-test between without-regularization and L1-regularization:

   TtestResult(statistic=array([-0.16941808]),pvalue=array([0.86921461]),df=array([9]))

   Differences in means is: -0.001547113470974304

3) T-test between with-dropout and L1-regularization:

   TtestResult(statistic=array([1.10417291]), pvalue=array([0.29816309]), df=array([9]))

   Differences in means is: 0.008217234910543325

For training set size 18

1) T-test between without-regularization and with-dropout:

   TtestResult(statistic=array([-0.03468024]), pvalue=array([0.9730917]), df=array([9]))

   Differences in means is: -0.00032889338080011044

2) T-test between without-regularization and L1-regularization:

   TtestResult(statistic=array([1.1241778]), pvalue=array([0.29002619]), df=array([9]))

   Differences in means is: 0.004635510816393129

3) T-test between with-dropout and L1-regularization:

   TtestResult(statistic=array([0.7177902]), pvalue=array([0.49109711]), df=array([9]))

   Differences in means is: 0.0049644041971932396

Reflection

Q1) For training set size 1, which model type do you prefer? Justify your choice.

Answer: In T-test, p-value is greater than 0.05 then the change is not significant, but the difference in means is positive in favour of the dropout model. (mean FVAF value of dropout is greater than the other models). Therefore, dropout model is better for training set 1.

Q2) For training set size 18, which model type do you prefer? Justify your choice.

Answer: Just like in training set 1, In T-test p-value is greater than 0.05 then the change is not significant, but the difference in means is positive in favour of the dropout model. (mean FVAF value of dropout is greater than the other models). Therefore, dropout model is better for training set 18.

Q3) Looking at the test performance curves, can you conclude anything about which model approach is most appropriate in general?

Answer: The graph shows that dropout model slightly outperforms "L1 regularization" and "no regularization", especially in later folds of cross-validation, which implies it may generalize better. While L1 also shows consistent performance, the non-regularized model lags slightly, which means that it is overfitting.