TMVA Optimizers

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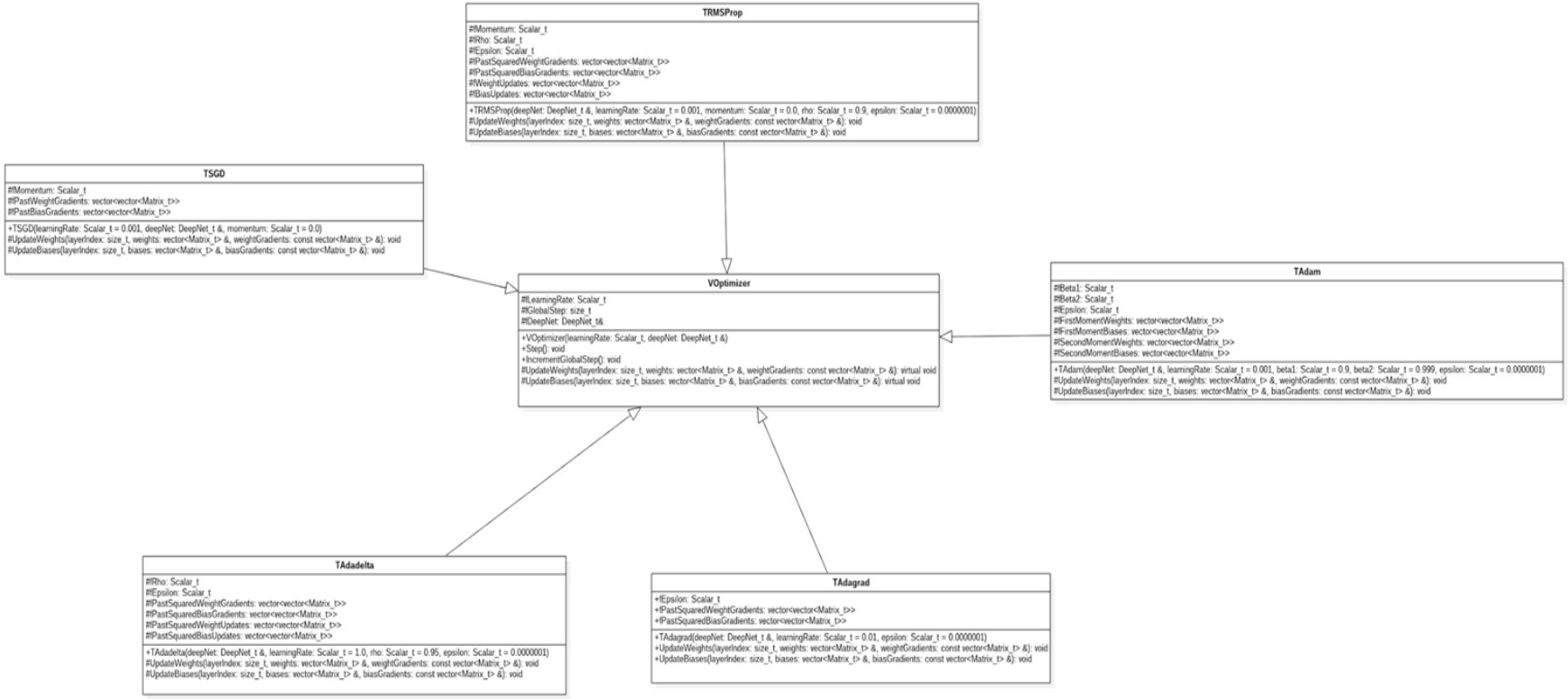
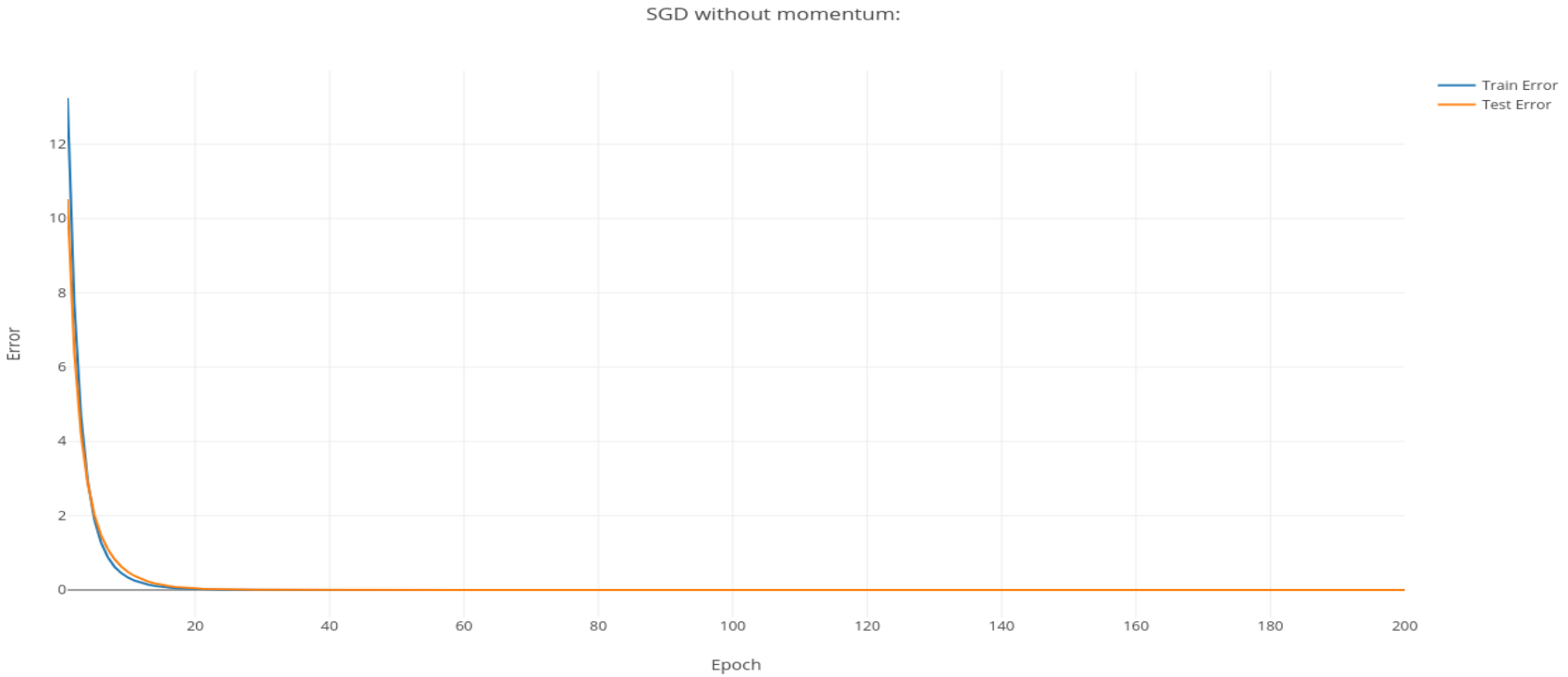
Work done:

- Implemented various optimizers including SGD, Adam, Adagrad, Adadelta, RMSProp.
- Implemented various operations needed for performing the updates like ConstAdd, ConstMult, SquareElementWise, SqrtElementWise, ReciprocalElementWise in Reference, CPU and GPU architectures.
- Implemented a new evaluation metric called meanAbsoluteError() between two matrices which is used for testing the optimizers.
- Finally, after getting reviewed from Stefan and Lorenzo, Got all the PRs merged into root/master successfully :D

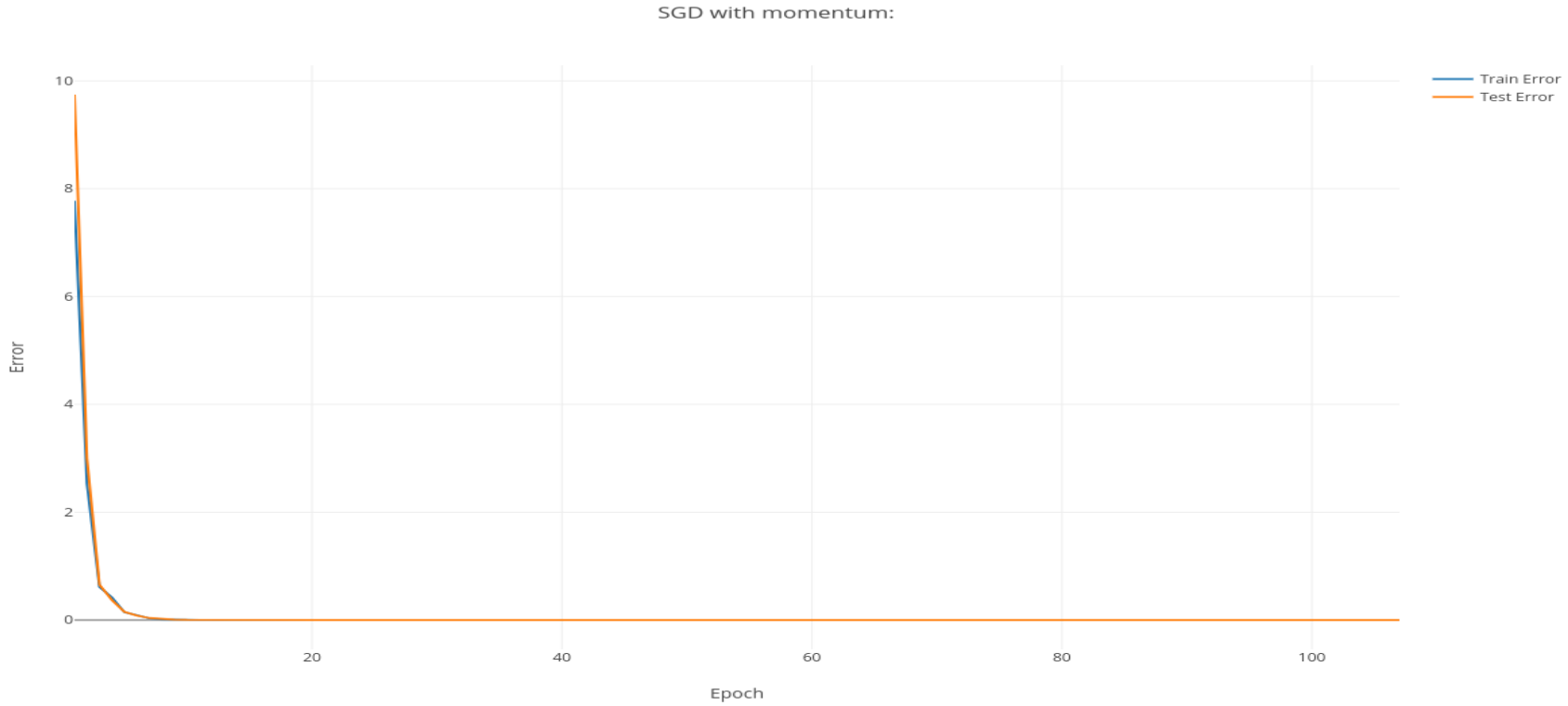
TMVA Optimizers - Overview:



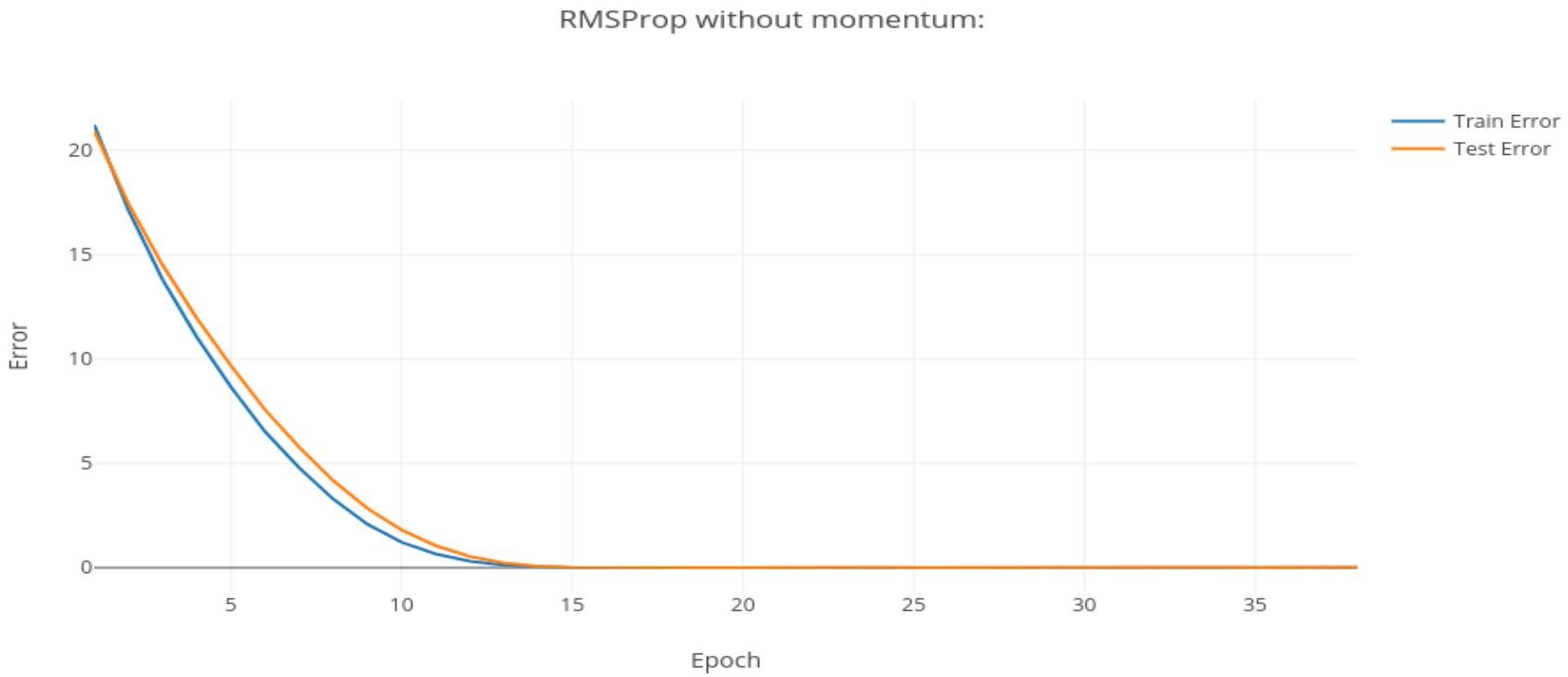
Unit tests results:



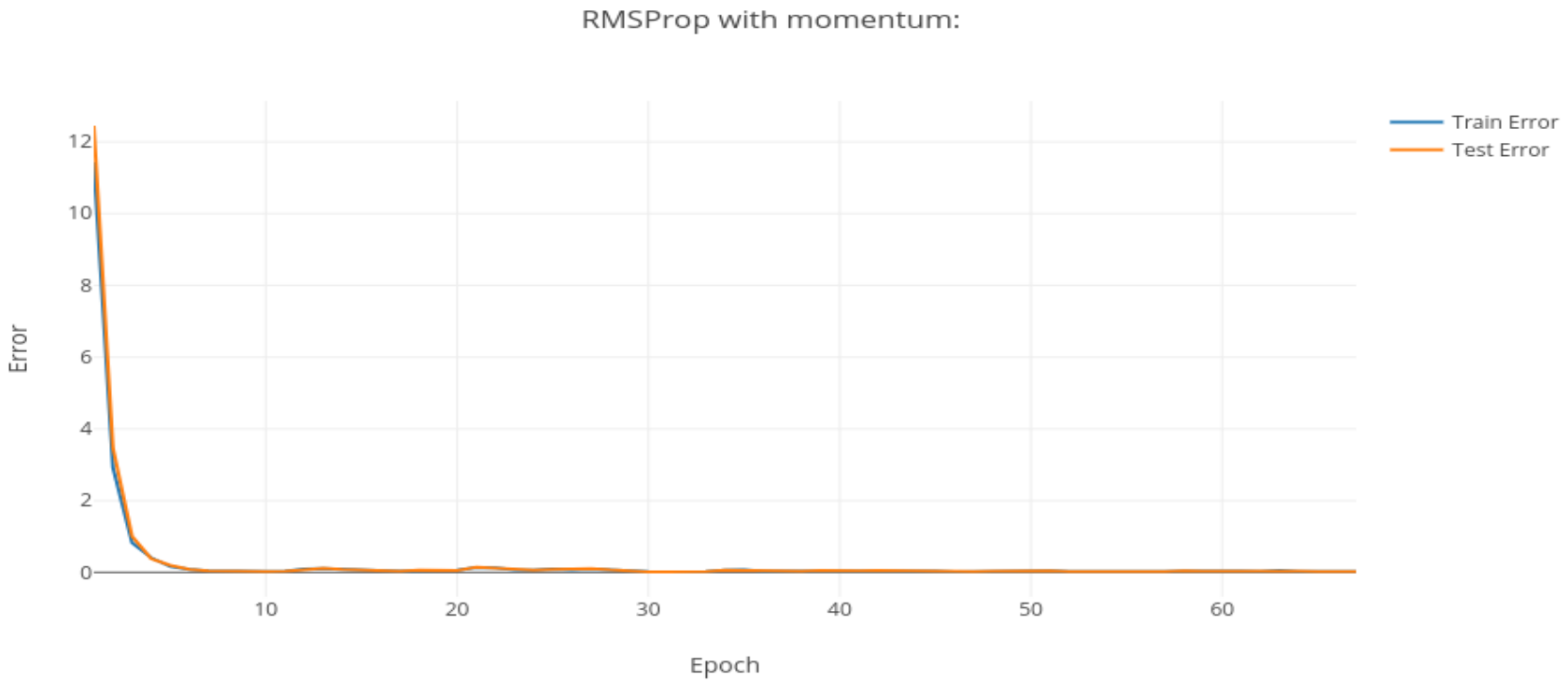
Unit tests results:



Unit tests results:



Unit tests results:



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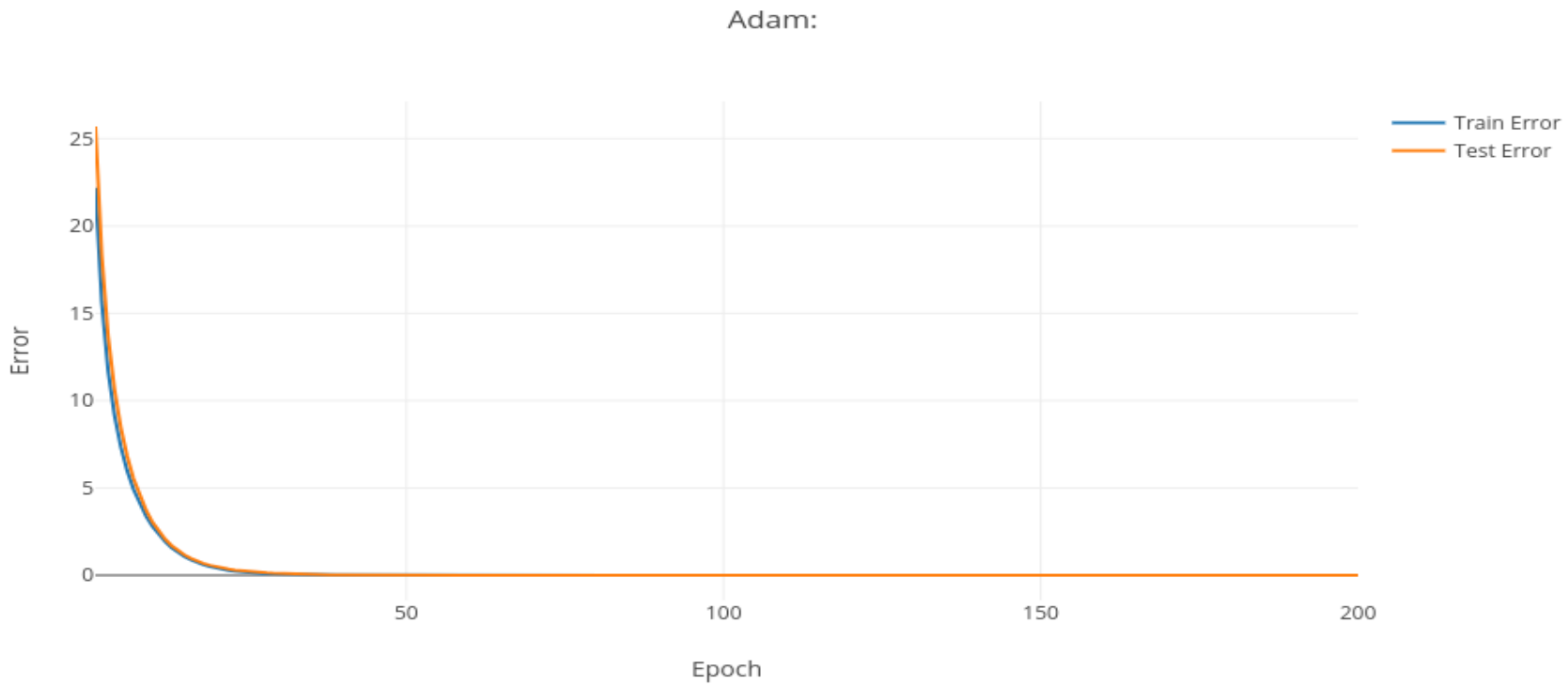
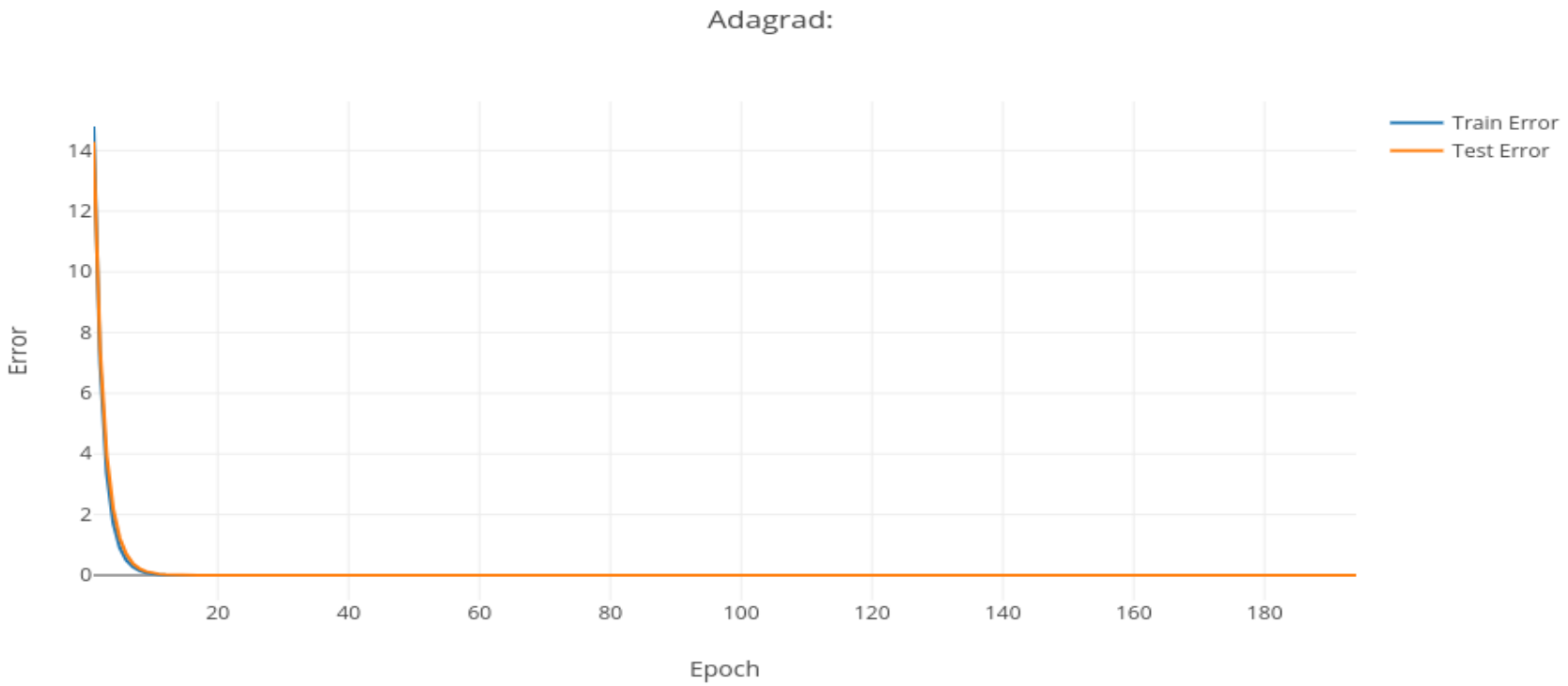
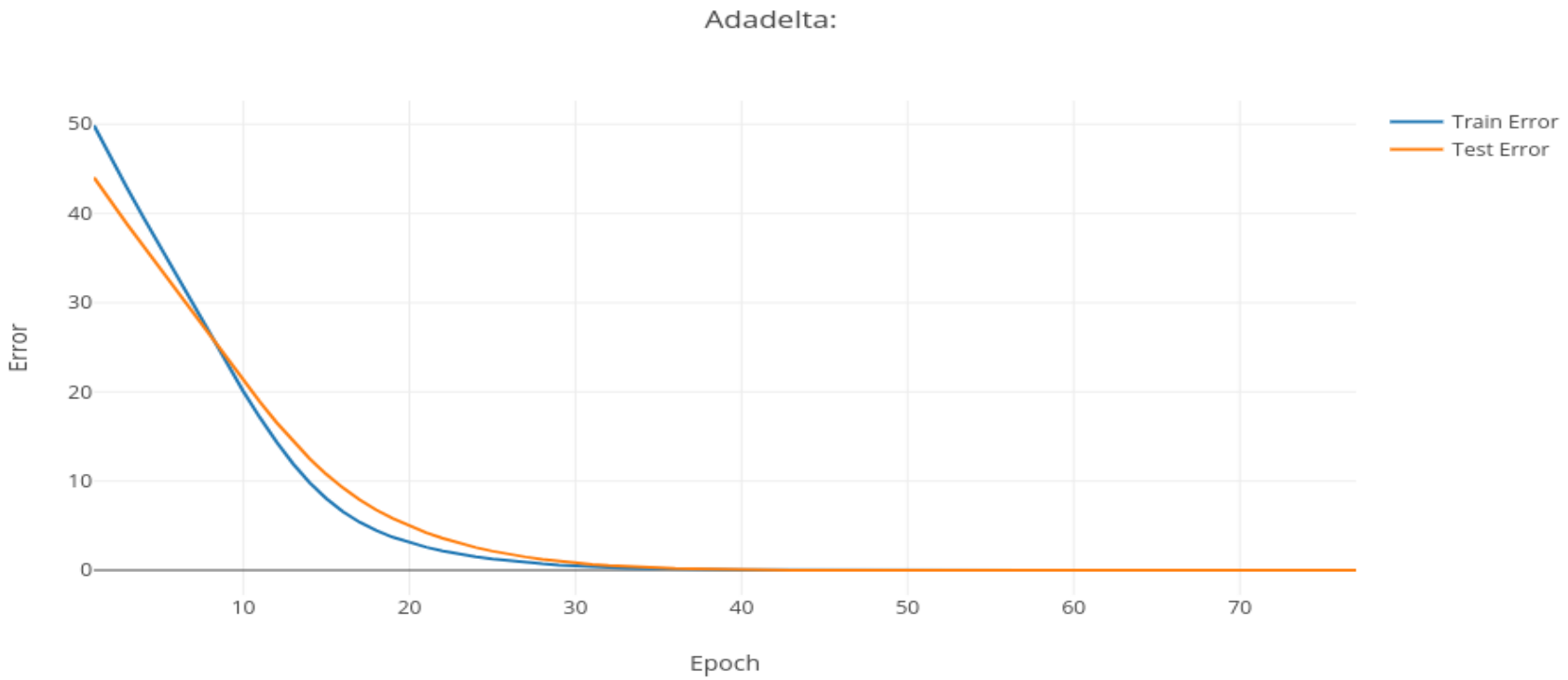


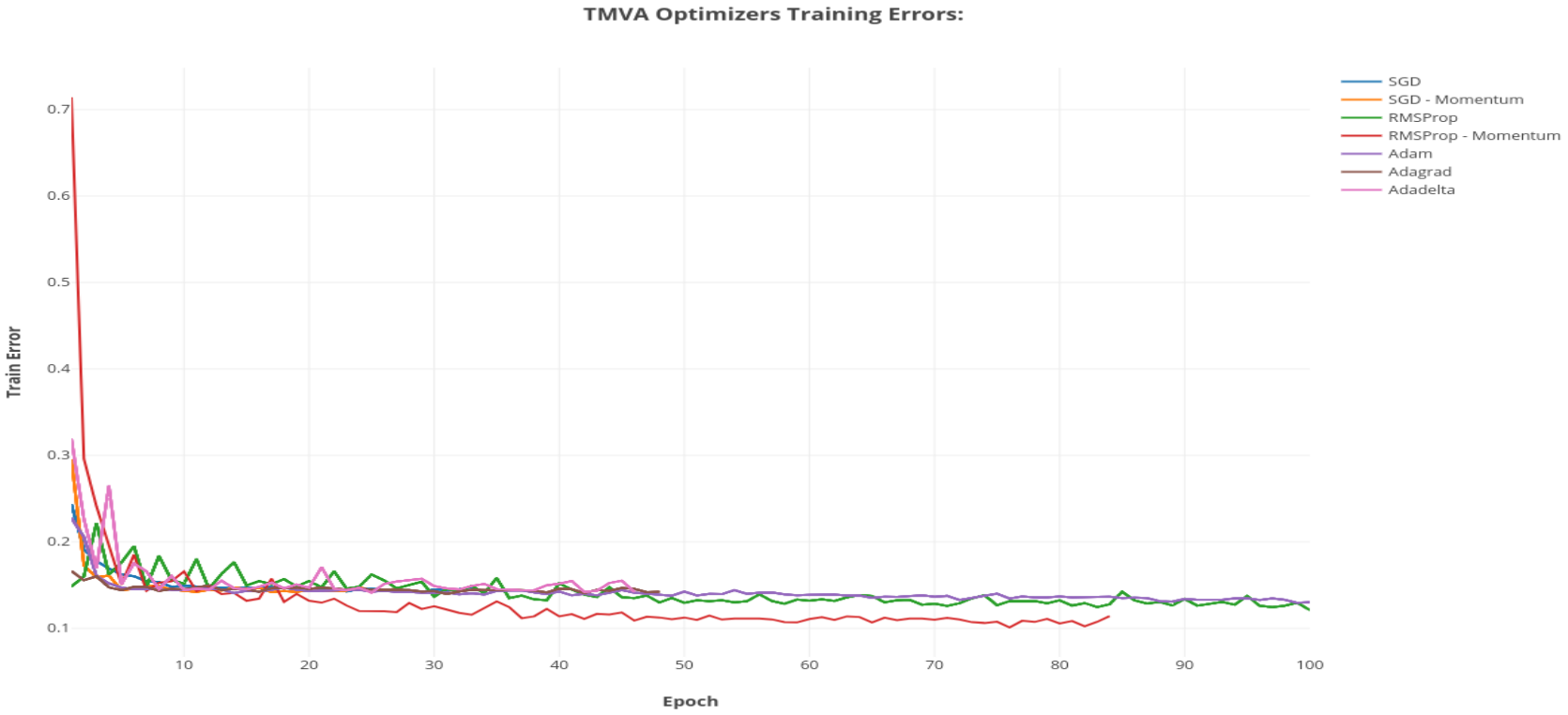
Unit tests results:



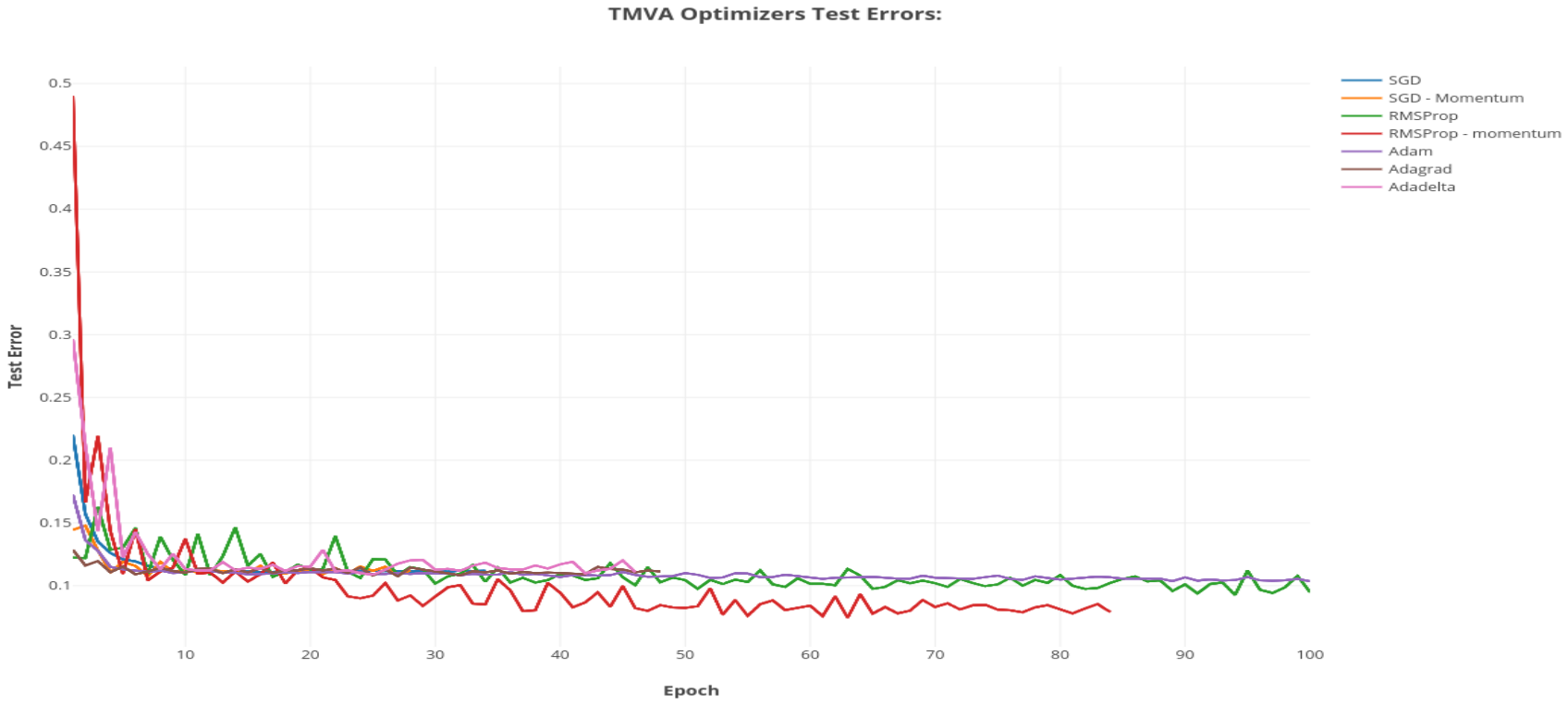
Unit tests results:



MethodDL test results:



MethodDL test results:



MethodDL test results:

Optimizer	Start Epoch	Train Error	Test Error	End Epoch	Train Error	Test Error
SGD	1	0.243649	0.220027	34	0.141692	0.110918
SGD - Momentum	1	0.295173	0.144552	28	0.141734	0.107662
RMSProp	1	0.148158	0.122384	100	0.121107	0.0926917
RMSProp - Momentum	1	0.71423	0.490361	84	0.101079	0.0745212
Adam	1	0.227436	0.172377	100	0.12949	0.103475
Adagrad	1	0.31913	0.128628	48	0.141207	0.107541
Adadelta	1	0.166242	0.296319	46	0.139588	0.108797

Future Work:

- Implement other optimizers like Adamax, Nadam and Nesterov accelerated SGD optimizers.
- Add Weight Decay implementation to optimizers.
- Benchmark the individual optimizers on separate datasets with tensorflow.


Thank
you