APPENDIX

150 epochs

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
Unidirectional LSTM	N_layer =4 Hidden_size = 128	20.22	0.674	21.914	0.687
Bidirectional GRU	N_layer =4 Hidden_size =128	13.248	0.661	15.842	0.768
Bidirectional RNN	N_layer =4 Hidden_size =128	49.18	1.553	42.295	1.335
Bidirectional LSTM	N_layer =4 Hidden_size = 128	14.067	0.667	15.842	0.709
ll+ReLU	Additional linear layer size = 128	18.631	1.056	21.158	1.144
GRU-bi+ll+relu	N_layer =4 Hidden_size =128	14.821	0.553	15.993	0.59
LSTM-bi+ll+ReLU	N_layer =4 Hidden_size = 128	14.843	0.712	15.798	0.739
RNN-bi+ll+ReLU	N_layer =4 Hidden_size =128	-	-	-	-
GRU+CNN	N_layer =2 Hidden_size = 256	14.95	0.608	15.928	0.622
LSTM+CNN	N_layer =2 Hidden_size = 256	14.577	0.583	16.144	0.562
GRU+CNN+ll+ReLU	N_layer =2 Hidden_size = 256 (w/o dropout and normalization)	14.997	0.724	16.663	0.7
GRU+CNN+ll+ReLU	N_layer =2 Hidden_size = 256 (w/ dropout and normalization)	15.684	0.680	16.944	0.72
LSTM + CNN+ ll+	N_layer =2	15.529	0.616	16.014	0.614

ReLU	Hidden_size = 256 (w/o dropout and normalization)				
LSTM + CNN+ ll+ ReLU	N_layer =2 Hidden_size = 256 (w/ dropout and normalization)	14.621	0.742	15.733	0.757

GRU+CNN	N_layer =4 Hidden_size = 128	14.222	0.532	15.582	0.523
LSTM+CNN	N_layer =4 Hidden_size = 128	98.715	114.001	98.839	132.275
RNN+CNN	-	-	-	-	-

GRU+CNN	N_layer =4 Hidden_size = 256	14.532	0.645	14.415	0.591
LSTM+CNN	N_layer =4 Hidden_size = 256	100.0	3.356	100.0	3.165
GRU+CNN+ll+ReLU	N_layer =4 Hidden_size = 256	100.0	3.364	100.0	3.158
LSTM+CNN+ll+ReLU	N_layer =4 Hidden_size = 256	100.0	3.383	100.0	3.177
GRU+CNN+ll+ReLU+dropout+norm	N_layer =4 Hidden_size = 256	16.238	0.627	15.734	0.571
GRU+CNN+ll+ReLU+norm	N_layer =4 Hidden_size = 256	15.108	0.681	15.128	0.643
LSTM+CNN+ll+ReLU+dropout+norm	N_layer =4 Hidden_size = 256	15.419	0.626	15.733	0.563
LSTM+CNN+ll+ReLU+norm	N_layer =4 Hidden_size = 256	15.972	0.653	15.798	0.597

30 Epochs

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		28.444	0.905	29.047	0.901
CNN+LSTM+LL+ReLU	Normalization+dropout(p=0.2)+preprocessing	16.902	0.616	18.781	0.628
CNN+GRU+LL+ReLU	Normalization+dropout(p=0.2)+preprocessing	16.438	0.566	18.478	0.584

150 Epochs

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
CNN+LSTM+LL+ReLU	Normalization+dropout(p=0.2)+preprocessing	13.004	0.896	16.641	1.113
CNN+GRU+LL+ReLU	Normalization+dropout(p=0.2)+preprocessing	12.982	0.871	18.132	0.966

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
CNN+LSTM+LL+ReLU	preprocessing	15.33	0.773	17.89	0.884
CNN+GRU+LL+ReLU	preprocessing	13.114	0.821	16.555	1.006

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
CNN+LSTM	preprocessing	13.735	0.855	16.706	1.000
CNN+GRU	preprocessing	12.960	0.764	15.885	0.917

Multiple Users:

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
CNN+LSTM	preprocessing				
CNN+GRU	preprocessing	13.607	0.613	13.058	0.593

Multiple Users:

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
CNN+GRU+ll+Relu	Normalization+dropout(p=0.2)+preprocessing	13.884	0.703	13.267	0.676

Multiple Users:

Name of Architecture Change	Hyper Parameter Chosen	CER Validation	CTC Loss Validation	CER Testing	CTC Loss Testing
Baseline		19.65	1.01	22.67	1.1
CNN+GRU+ll+Relu	Normalization + preprocessing	14.446	0.775	14.475	0.745

GRU+CNN	N_layer =4 Hidden_size = 256	14.532	0.645	14.415	0.591

GRU+CNN+ll+ReLU+dropout+norm	N_layer =4 Hidden_size = 256	16.238	0.627	15.734	0.571
GRU+CNN+ll+ReLU+norm	N_layer =4 Hidden_size = 256	15.108	0.681	15.128	0.643

GRU+CNN	N_layer =4 Hidden_size = 256 preprocess	12.959	0.764	15.885	0.916
GRU+CNN+ll+ReLU+dropout+norm	N_layer =4 Hidden_size = 256 Preprocess	13.469	0.978	15.582	0.985
GRU+CNN+ll+ReLU+norm	N_layer =4 Hidden_size = 256 Preprocess	13.491	1.023	15.841	1.192

GRU+CNN+ll+ReLU+dropout+norm	N_layer =4 Hidden_size = 256 With dropout and norm+ With Preprocessing	13.469	0.978	15.582	0.985
GRU+CNN+ll+ReLU+norm	N_layer =4 Hidden_size = 256 With norm + with Preprocessing	13.491	1.023	15.841	1.192
GRU+CNN	N_layer =4 Hidden_size = 256 With Preprocessing	12.959	0.764	15.885	0.916
GRU+CNN	N_layer =4 Hidden_size = 256 No Preprocessing	14.532	0.645	14.415	0.591
GRU+CNN	N_layer =4 Hidden_size = 256 No Data Augmentation	12.073	0.657	16.771	0.924
GRU+CNN	N_layer =4 Hidden_size = 256 No Augmentation Multiple User	17.590		19.718	