

HANDWRITTEN ARABIC TEXT RECOGNITION



OUTLINE



PROBLEM
STATEMENT



RELATED WORK



PROPOSED MODEL
ARCHITECTURE



FINAL MODEL
ARCHITECTURE



RESULTS



CONCLUSION



FUTURE WORK



TEAM MEMBER
CONTRIBUTION



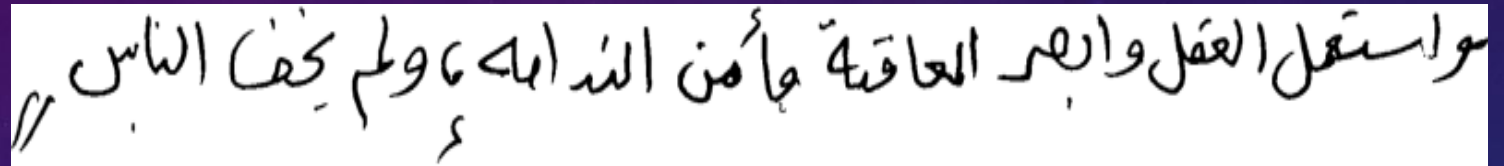
LIVE DEMO

PROBLEM STATEMENT



PROBLEM STATEMENT

Recognize and extract Arabic handwritten text lines from images



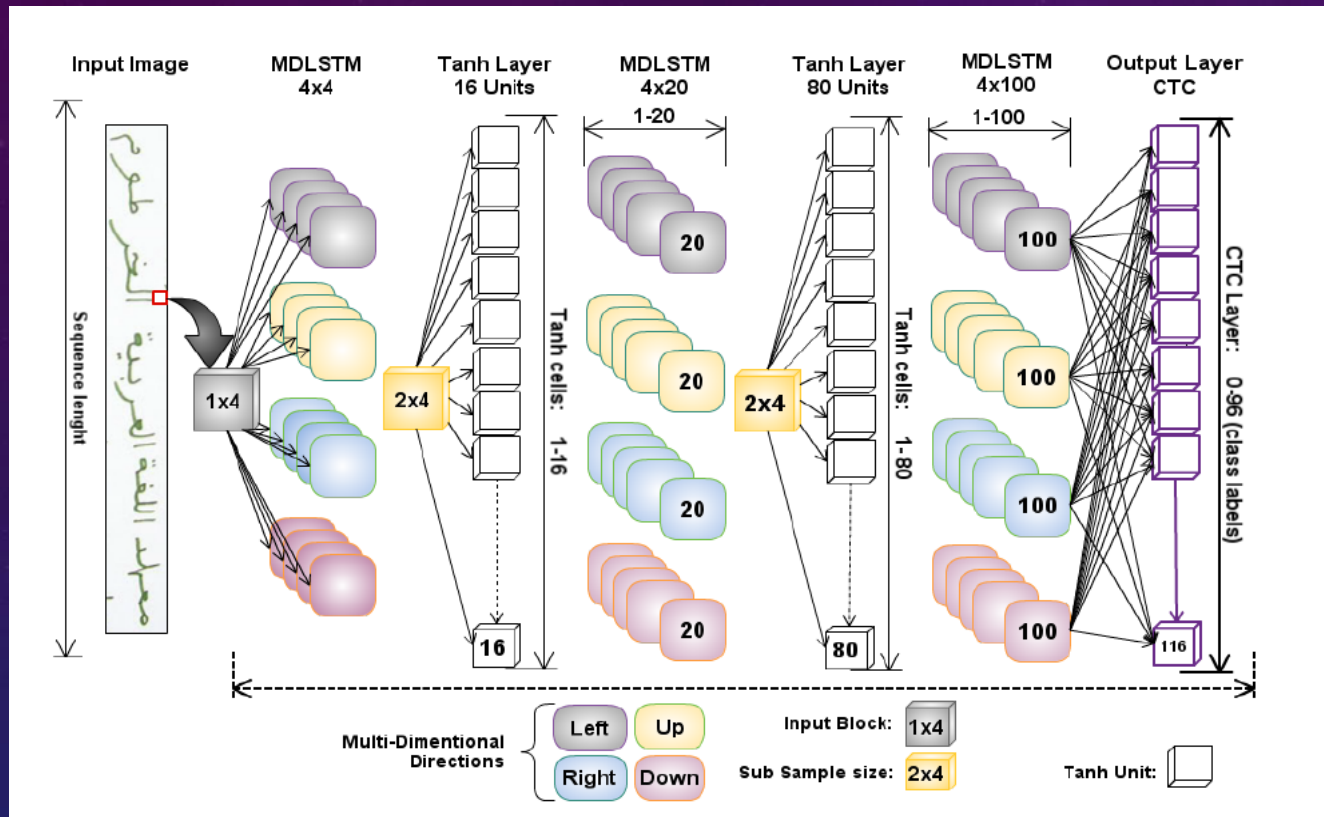
A challenging problem !

- More complex compared to handwritten Latin text recognition
- Cursive script and joined writing
- Same character variations
- Large number of words and variations in font style

RELATED WORK



2 PAPERS ON KHATT DATASET (SELECTED DATASET)



عن الخطاب في الأثره ما فضل ما رزقهم الله تعالى وحسن به كلهم بالعدل انذ ب هـ د ك ا م ن

a) Original sample.

عن الخطاب في الأثره ما فضل ما رزقهم الله تعالى وحسن به كلهم بالعدل انذ ب هـ د ك ا م ن

b) Blur sample.

عن الخطاب في الأثره ما فضل ما رزقهم الله تعالى وحسن به كلهم بالعدل انذ ب هـ د ك ا م ن

c) Contours of text-line.

عن الخطاب في الأثره ما فضل ما رزقهم الله تعالى وحسن به كلهم بالعدل انذ ب هـ د ك ا م ن

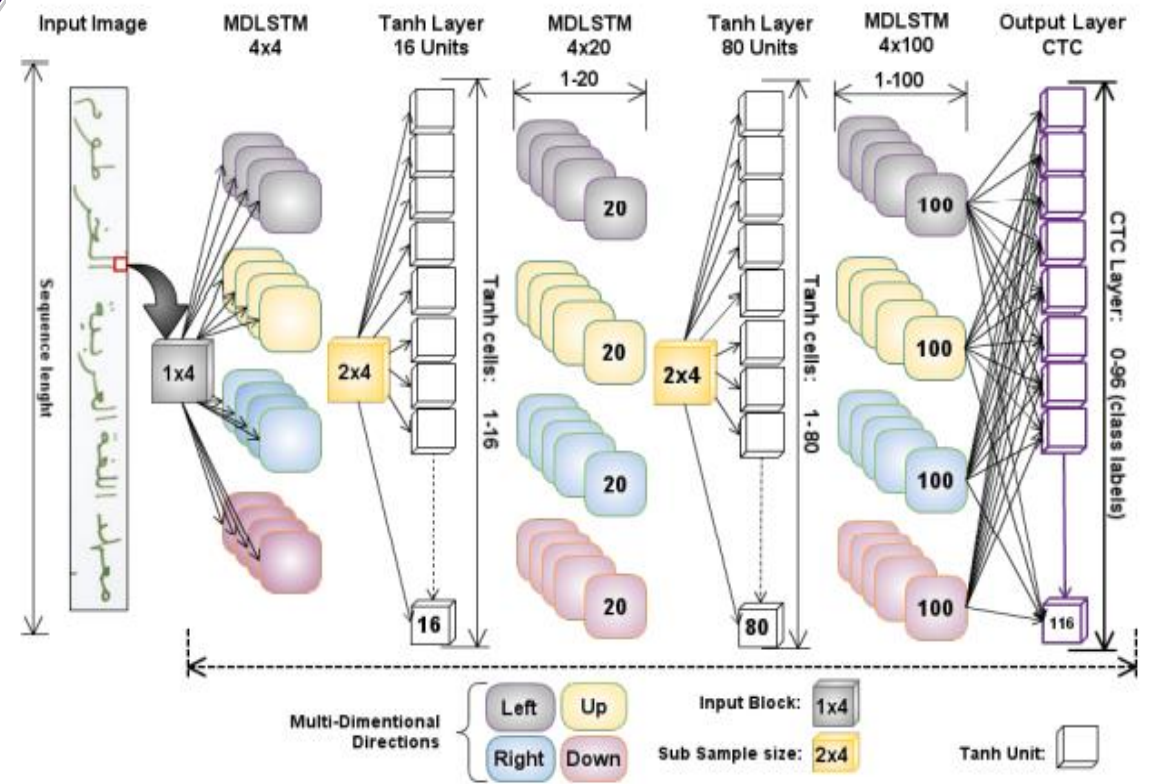
d) Edge enhancement.

عن الخطاب في الأثره ما فضل ما رزقهم الله تعالى وحسن به كلهم بالعدل انذ ب هـ د ك ا م ن

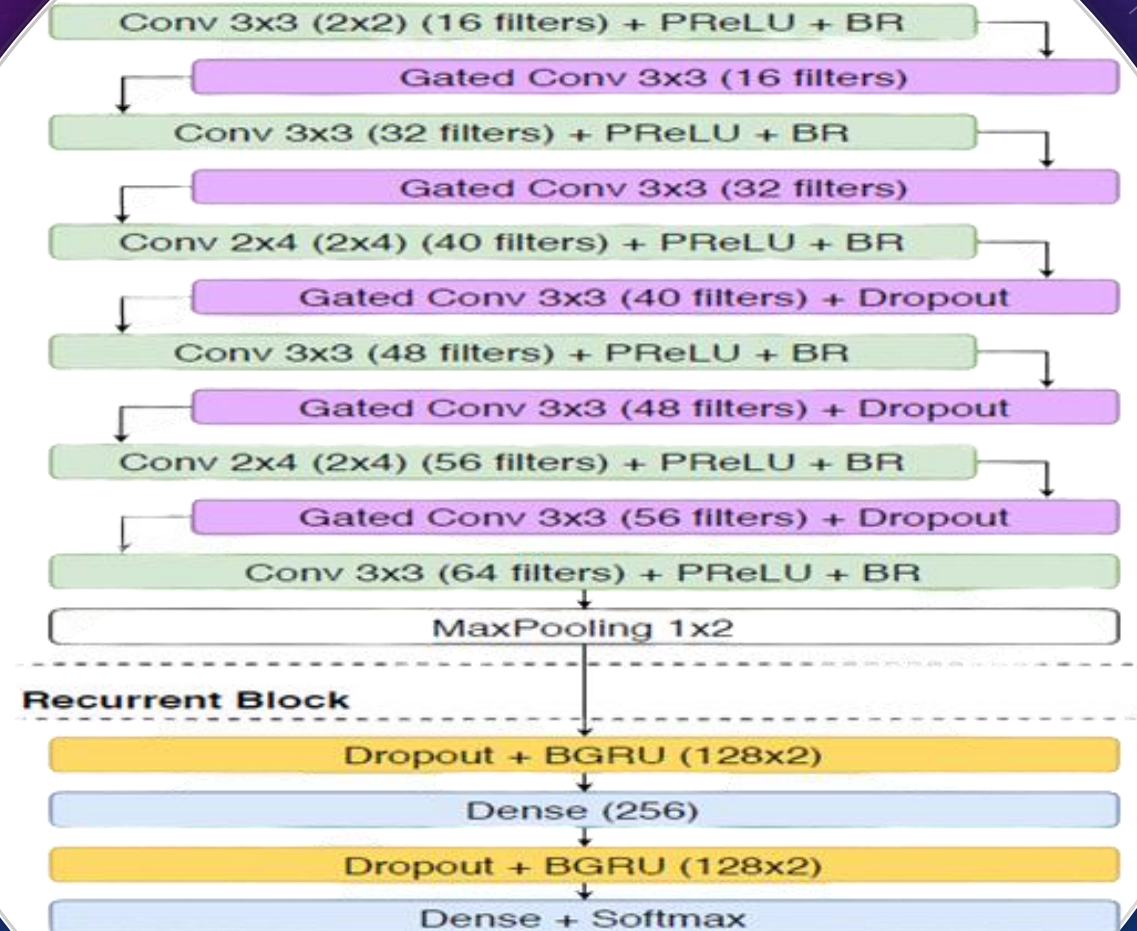
e) Bleed through effect.

Recognition rate was 75.8% , after applying data augmentation techniques increased to 80.02%

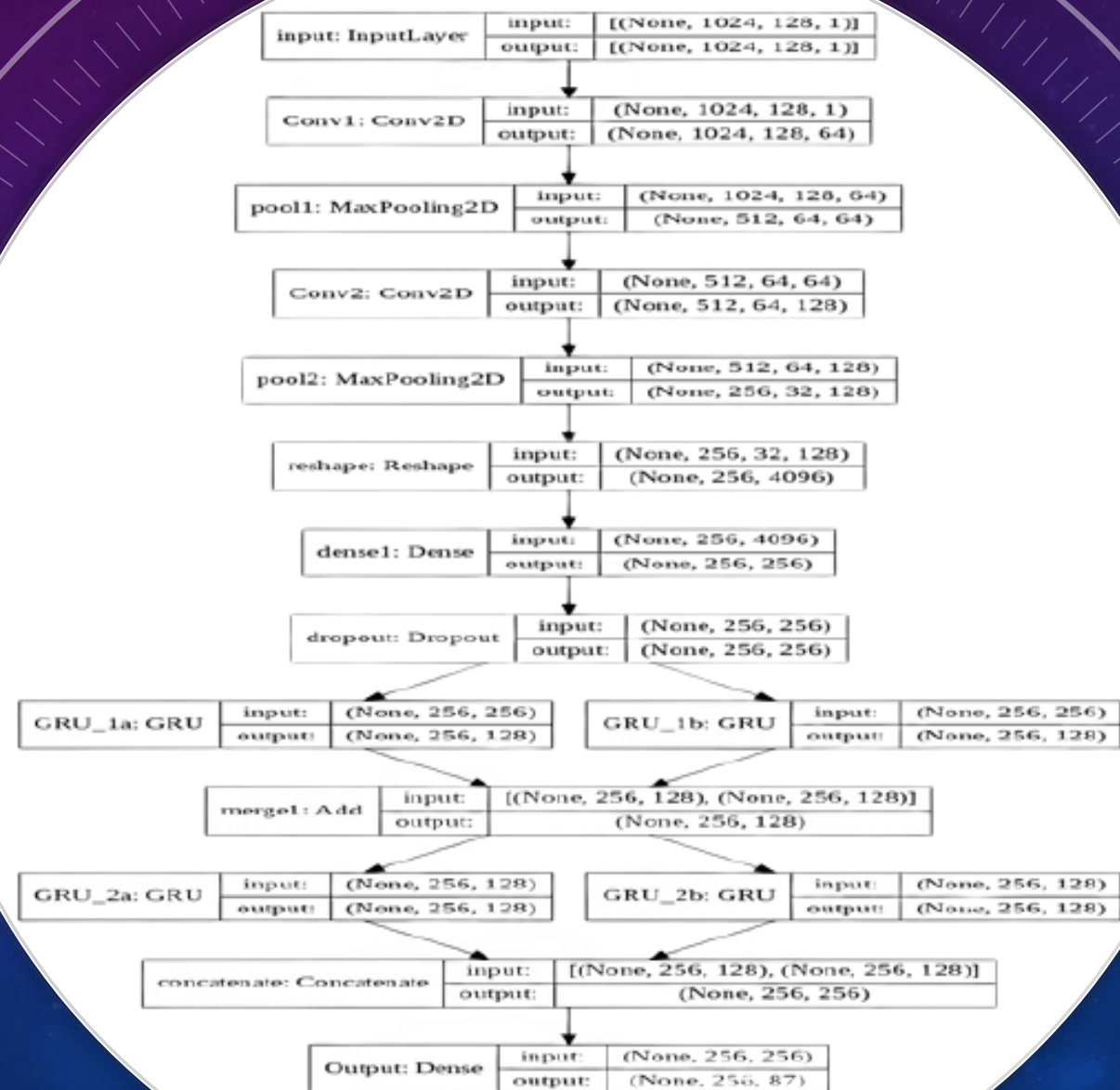
ORIGINAL MODEL ARCHITECTURE OF LITERATURE



ORIGINAL & PROPOSED MODEL ARCHITECTURE



FINAL MODEL ARCHITECTURE



RESULT



PREVIOUS WORK

- PREPROCESS KHATT DATASET.
- FILTER KHATT DATASET.
- APPLYING PROPOSED AND FINAL MODELS ON KHATT DATASET.

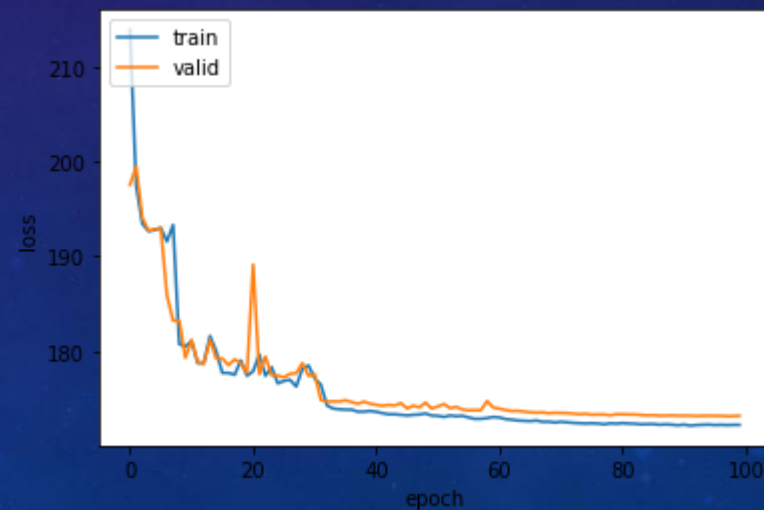
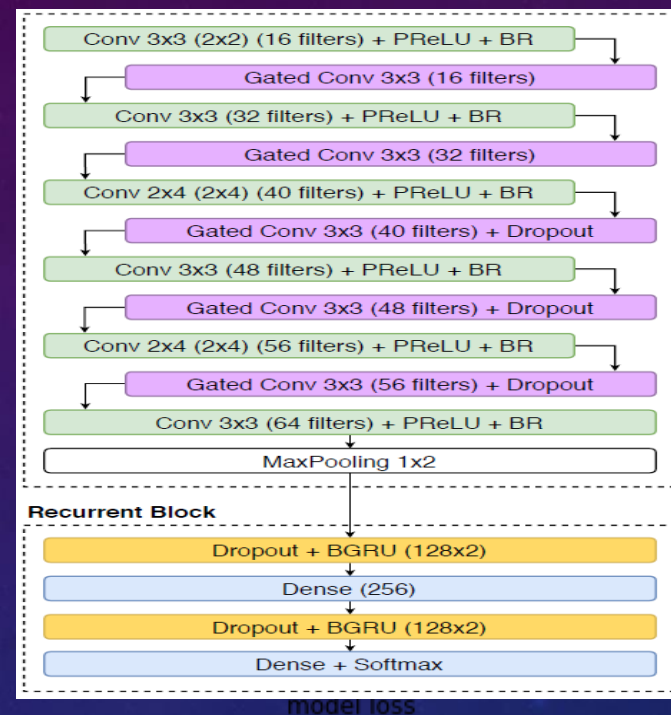
(PROPOSED MODEL)

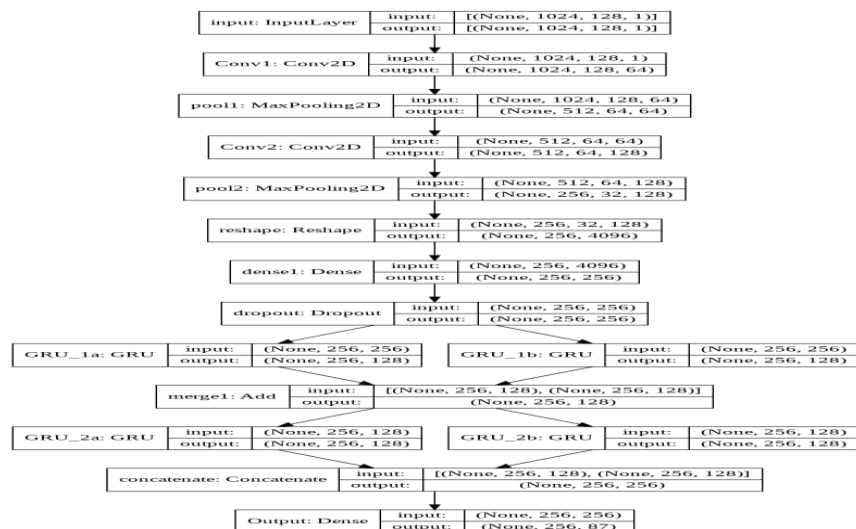
Valid
loss 173.15

Train
loss 172.22

CER 100%

WER 100%





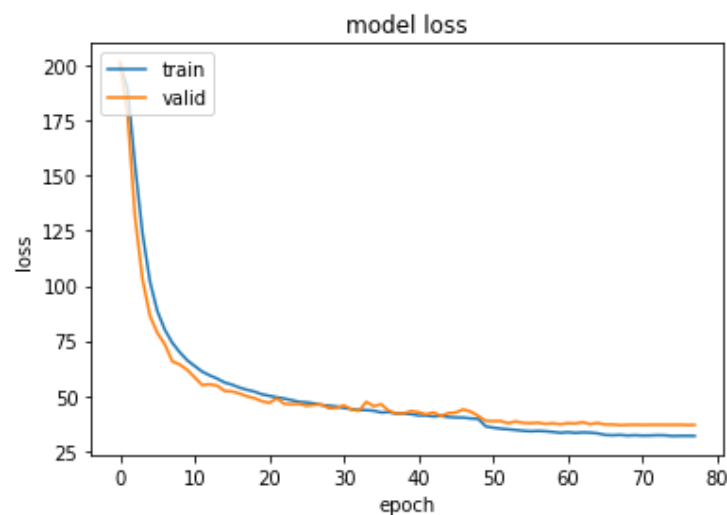
(FINAL MODEL)

Valid
loss 36.74

Train
loss 32.3

CER 18.93%

WER 59.81%



NEW WORK

- TUNE HYPERPARAMETERS.
- USE ATTENTION MECHANISM.
- CHANGE IN FINAL MODEL ARCHITECTURE.

MODEL 1

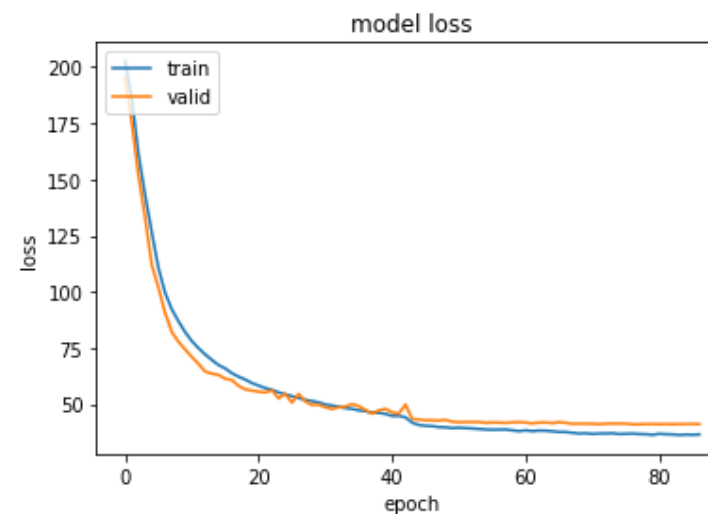
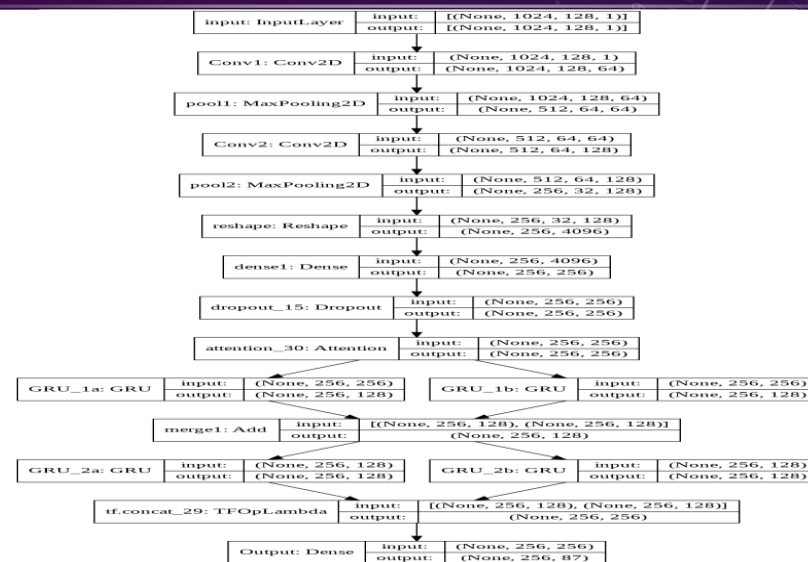
- Add Attention Layer

Valid
loss 41

Train
loss 36.88

CER 20.96%

WER 64.74%



MODEL 2

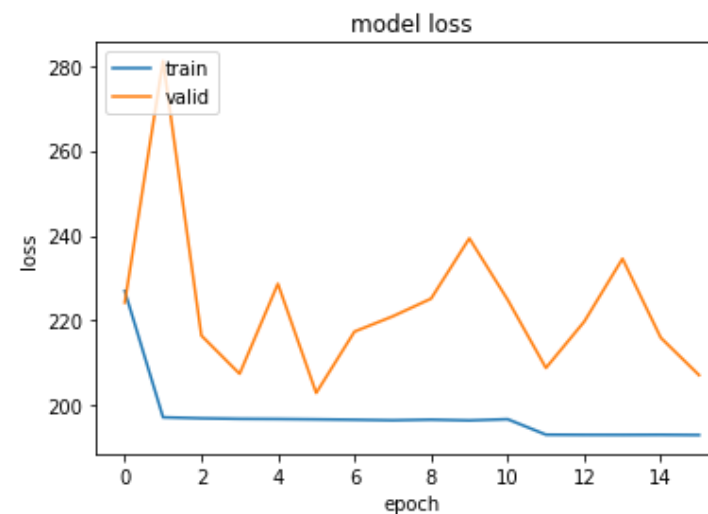
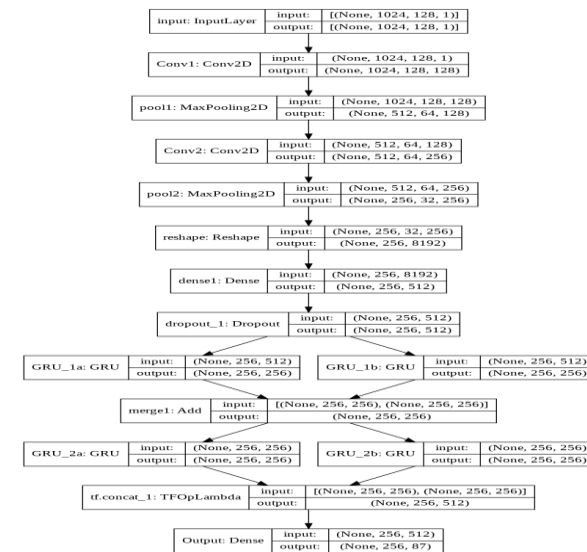
- Increased #filters and #units

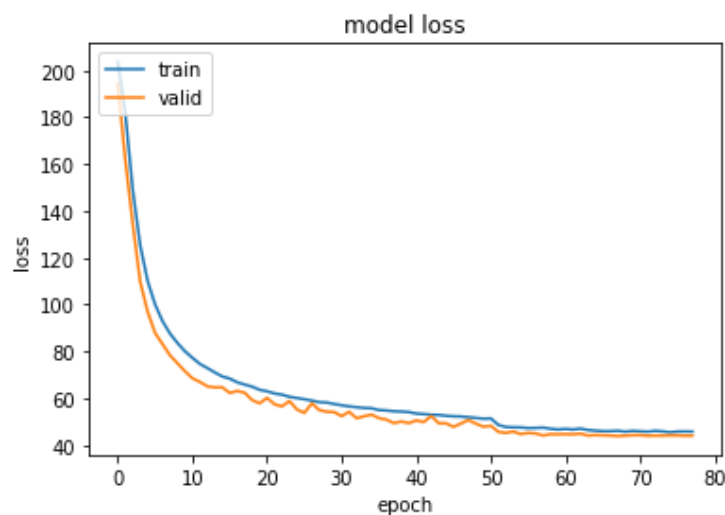
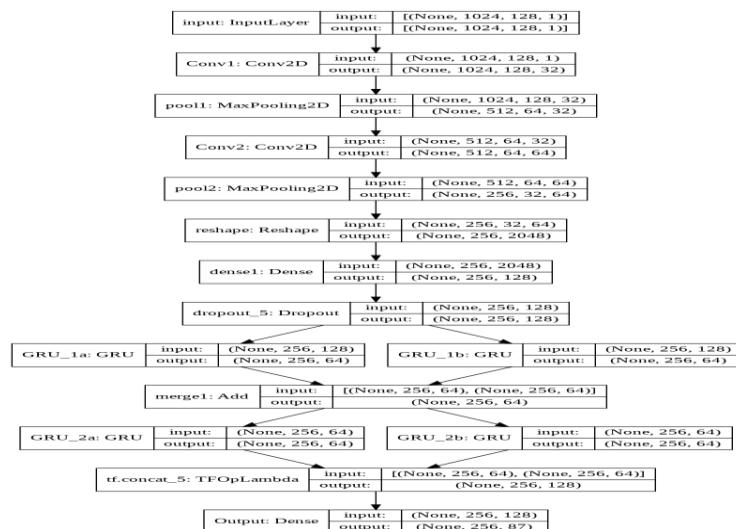
Valid
loss 203

Train
loss 196.77

CER 96.07%

WER 99.91%





MODEL 3

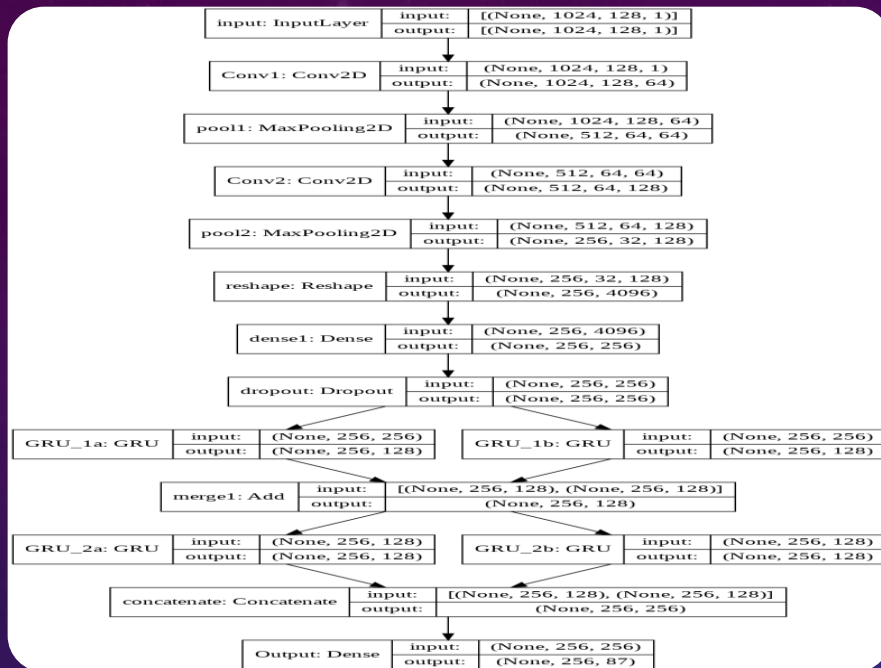
- Decreased #filters and #units

Valid
loss 43.86

Train
loss 46.08

CER 21.93%

WER 66.96%



MODEL 4

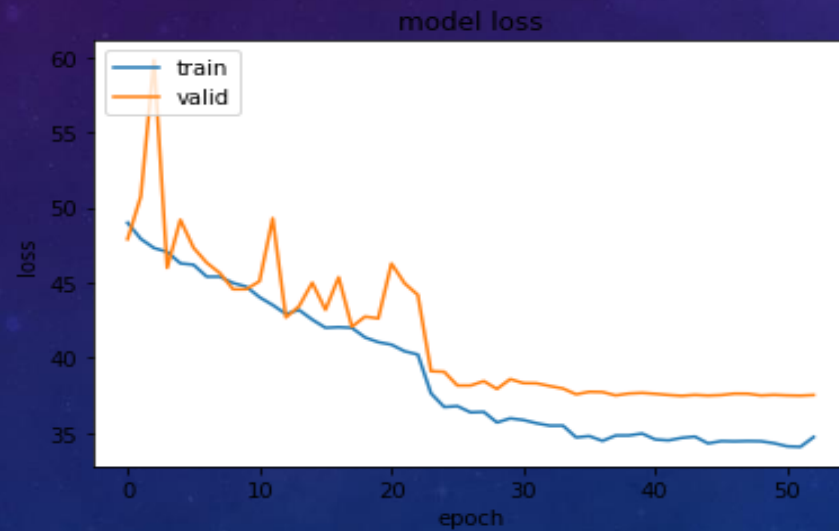
- Increase batch size

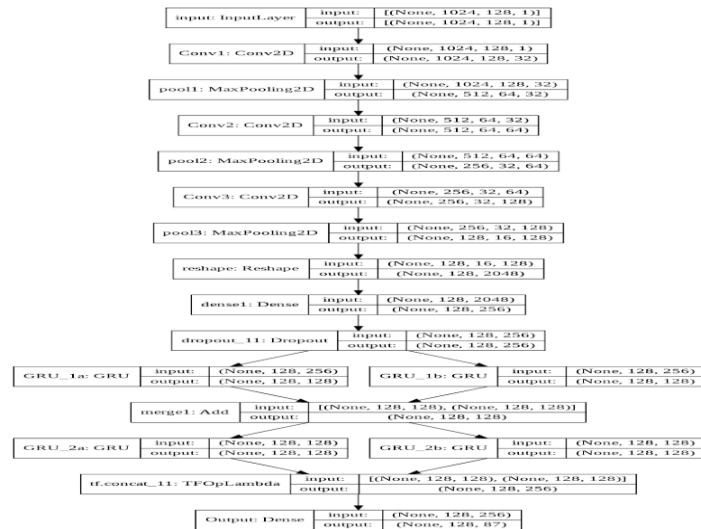
Valid
loss 37.47

Train
loss 34.67

CER 19.04%

WER 61.14%





MODEL 5

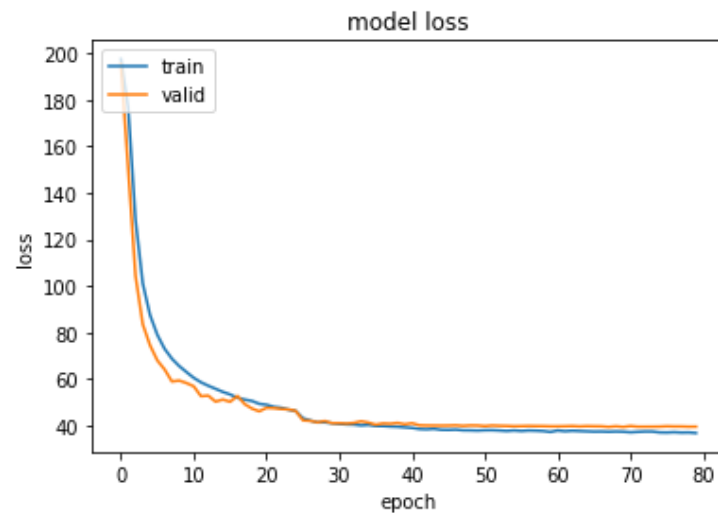
- Add CNN Layer

Valid
loss 39.27

Train
loss 37.23

CER 19.40%

WER 61.09%



MODEL 6

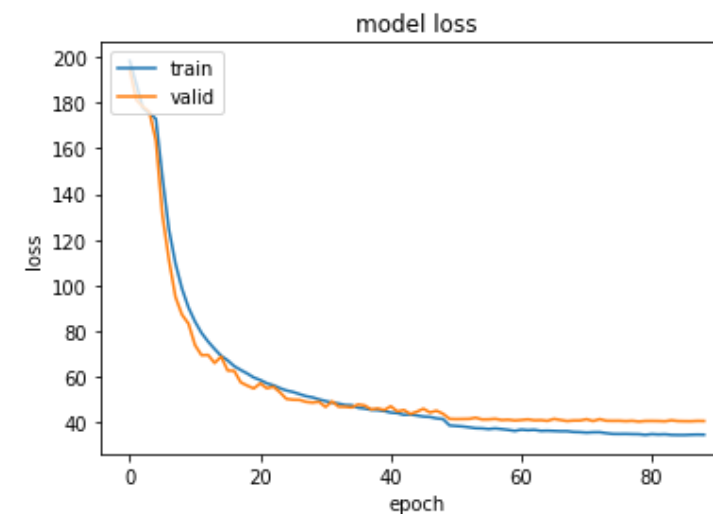
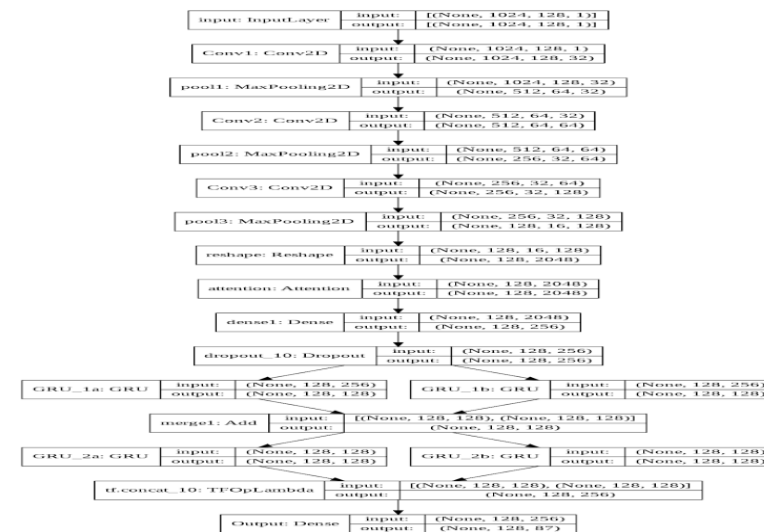
- Add CNN Layer + Attention Layer

Valid
loss 40.53

Train
loss 35.01

CER 19.71%

WER 61.33%



RESULT CONT.

Model	Train loss	Valid loss	CER	WER
Proposed	172.22	173.15	100	100
1	36.88	41	20.96	64.74
2	196.77	203	96.07	99.91
3	46.08	43.86	21.93	66.96
4	34.67	37.47	19.04	61.14
5	37.23	39.27	19.4	61.09
6	35.01	40.53	19.71	61.33
Final	32.3	36.74	18.93	59.81

RESULT CONT.



CONCLUSION







Data
Augmentation
increases result.

75.8% →
80.02%



Tune
hyperparameters
may lead to
underfitting  or
get more better
result  .



The proposed
model doesn't
give better result
as expected.



Less deep model
may lead to
better result
than deeper.



Our final result:
CER → 18.93%
Recognition Rate
→ 81.07%



FUTURE WORK





Increase dataset by mixing found datasets.



Tune more hyperparameters.



Try to change input to model to be a paragraph not a line.

TEAM MEMBER CONTRIBUTION



Merna El-Refaie (57)	Preprocess KHATT Dataset.
	Train Proposed Model.
	Use attention mechanism.

Neveen S.Nagy (61)	Filter KHATT Dataset.
	Train Final Model.
	Change in final model architecture.

We Both	Build and implement Proposed Model.
	Search for other models to get best result.
	Tune Hyperparameters.

THANK YOU



LIVE DEMO

