Assignment on: Feed-forward Neural Network



Bangladesh University of Engineering and Technology

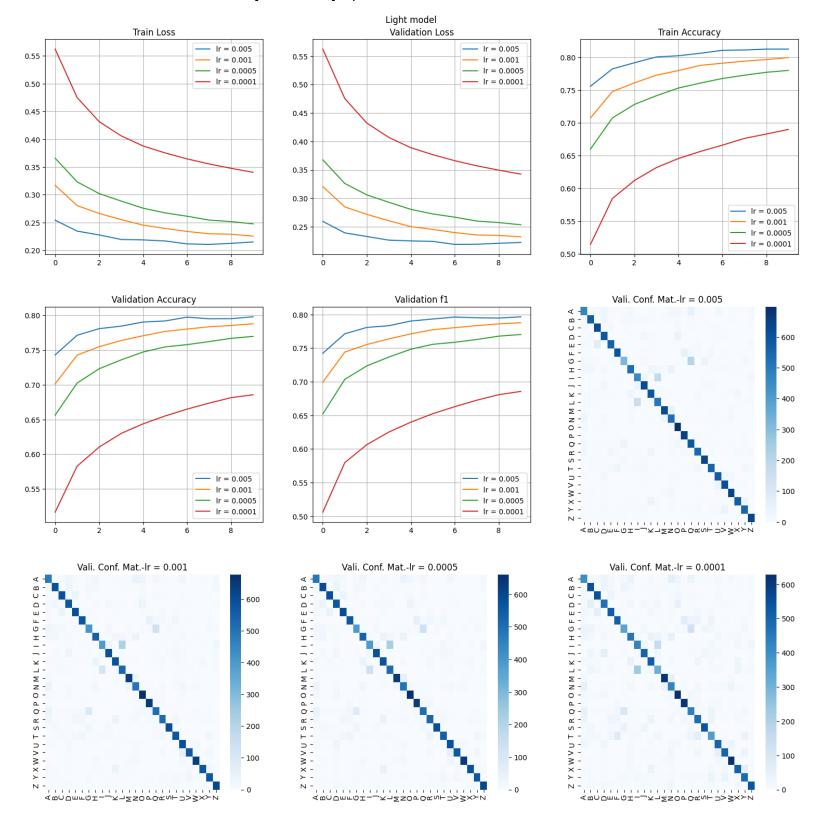
Course: CSE 472 (Machine Learning Sessional)

Date of Submission: 03.01.2024

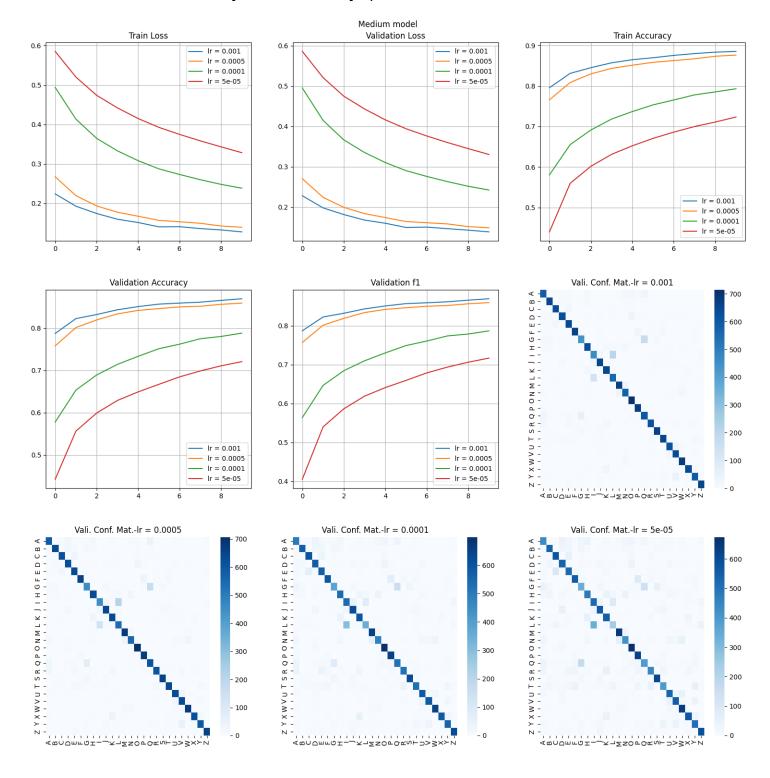
Submitted by:

Abdur Rafi 1805008

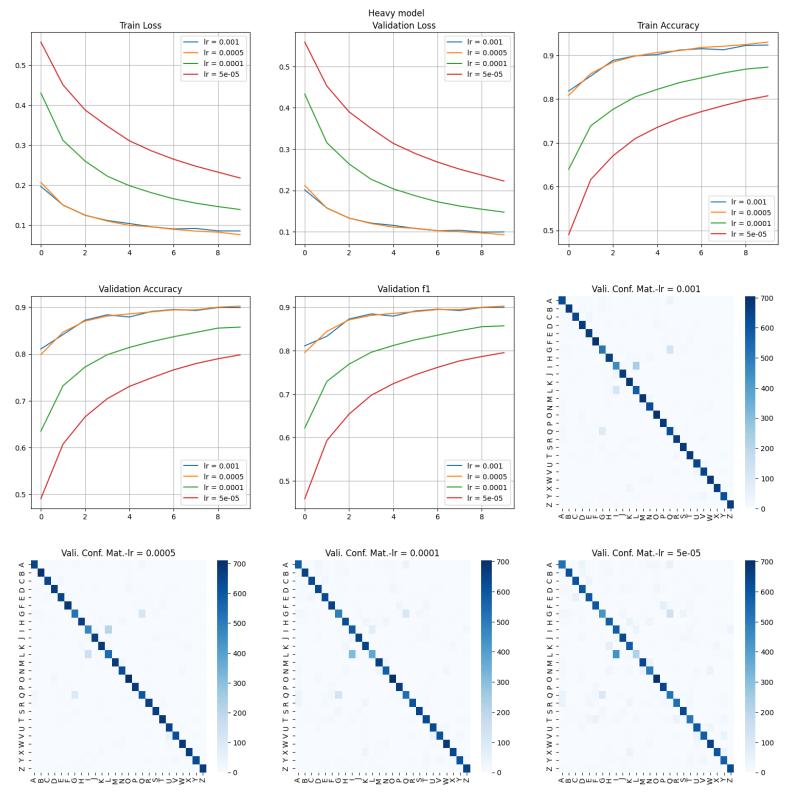
Model Architecture : [784, 32, 26], #params = 25978



Model Architecture: [784,128,64,32,26], #params = 111674



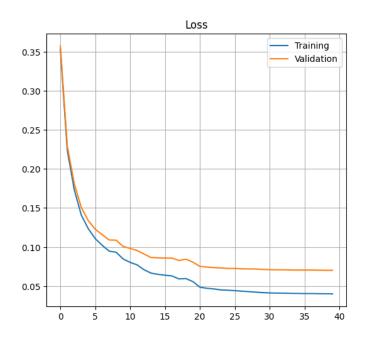
Model Architecture : [784,512,256,128,64,32,26], #params = 577338

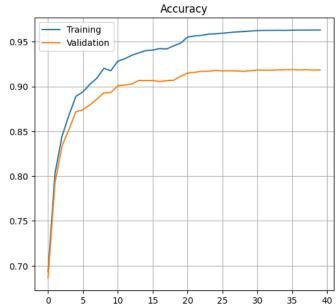


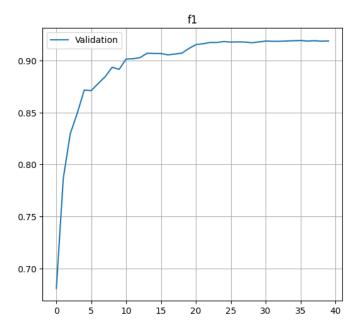
Best Performing Model

Model Architecture : [784, 1024, 256, 128, 64, 32, 26], #params = 1110330

Best Model







Validation Confusion Matrix

Valuation Contactor Flat IX																											
	დ -	676	1	3	3	5	0	8	4	0	0	0	0	0	6	6	1	25	2	0	2	0	0	1	0	0	1
	- م	2	693	0	6	2	1	9	4	0	0	0	1	0	0	4	1	1	0	0	1	1	0	1	0	0	3
	υ -	1	0	661	1	13	1	0	0	0	0	0	3	0	0	5	0	1	1	0	1	0	1	0	0	0	0
	ი -	3	0	0	687	1	0	0	0	1	2	0	1	0	3	17	3	4	0	0	0	0	2	0	0	0	0
	o -	3	3	13	0	674	6	0	1	0	0	1	0	0	0	0	1	0	4	0	2	0	0	0	0	0	3
	-	1	0	0	0	2	708	3	0	0	1	0	2	0	0	0	6	1	2	2	13	0	0	0	0	0	0
	ნ -	13	8	1	0	1	0	562	0	0	4	1	0	3	0	1	0	97	1	9	1	0	0	0	1	4	0
	- ع	4	4	0	2	0	1	0	683	1	0	5	7	2	14	0	0	0	0	0	2	1	0	1	1	1	0
		0	0	1	2	0	0	0	0	539	18	0	153	0	0	0	0	0	0	1	1	0	0	0	0	0	7
	· - -	1	0	0	5	0	0	9	0	27	674	0	2	0	0	0	1	0	0	9	2	1	5	0	0	3	1
	ϫ -	2	3	1	0	0	0	0	13	0	0	687	3	0	1	0	0	0	3	0	1	0	1	1	11	0	0
		0	1	2	0	1	1	0	3	182	3	3	515	0	0	0	0	1	1	0	1	0	0	0	2	0	2
ē	٤ -	0	0	0	0	0	0	0	4	0	0	1	0	692	16	0	0	0	0	0	1	0	1	2	1	1	0
True	- ء	3	0	0	4	1	0	0	5	0	0	2	0	6	649	1	0	0	5	0	0	2	2	6	3	1	0
	o -	4	1	0	16	0	0	0	0	0	0	0	0	1	1	713	0	1	0	0	0	3	0	0	0	0	0
	a -	2	2	0	3	1	6	0	0	1	0	0	1	0	2	1	683	4	1	0	1	0	0	1	0	0	0
	ъ-	22	0	1	2	4	1	83	0	0	0	0	2	0	1	2	5	630	2	3	0	2	1	0	0	1	2
	<u>-</u> -	14	1	1	0	6	1	1	2	0	0	7	1	0	2	0	3	2	683	0	4	0	7	0	1	0	0
	ω -	0	2	1	1	1	1	10	0	1	5	0	0	0	0	0	0	0	0	685	1	0	0	1	0	0	1
	- ب	0	1	1	0	2	8	0	1	4	2	1	2	0	0	0	0	1	6	1	703	0	0	0	0	5	1
	5 -	0	1	0	5	0	0	0	1	0	2	1	0	1	4	1	0	0	0	0	0	657	10	7	0	1	0
	> -	0	0	0	1	0	0	0	0	1	7	0	1	0	2	0	0	0	6	0	0	26	647	2	1	8	0
	≽ -	0	0	0	3	0	0	1	0	0	0	1	1	3	14	0	0	0	0	0	0	4	4	689	0	0	0
	× -	1	0	0	1	0	1	0	1	1	0	14	0	0	2	0	0	0	0	0	2	0	1	0	681	3	2
	> -	3	0	0	1	0	0	2	1	0	3	1	2	0	0	0	0	3	4	0	5	8	18	0	4	646	1
	И -	4	1	0	0	4	0	4	0	2	0	0	1	0	0	0	0	0	0	0	7	0	0	0	6		676
		a	þ	Ċ	ď	ė	f	ģ	h	i	j	k	i	m Predi	n icted	0	þ	q	r	S	ť	ů	v	w	X	ý	z

- 700

- 600

- 500

- 400

- 300

- 200

- 100

- 0

Test Set Performance

Test Accuracy: 0.920625

Test Macro F1: 0.920622151867392

								_			Test	Set	Con	fusio	on M	latri	X										
Ф	- 737	1	2	7	5	2	7	3	0	0	0	0	0	2	7	2	15	1	0	1	3	0	0	1	0	4	
q	- 5	751	0	4	5	1	6	13	0	0	1	2	0	1	2	0	3	2	2	0	0	0	0	0	0	2	
U	- 0	2	761	1	17	0	0	0	0	0	0	3	0	0	4	0	1	4	2	2	2	0	1	0	0	0	
р	- 4	3	0	746	0	0	1	2	1	4	0	0	0	2	31	3	1	1	0	0	1	0	0	0	0	0	
Φ	- 2	1	17	0	764	2	2	0	1	1	1	3	0	0	0	1	0	2	2	1	0	0	0	0	0	0	
4	- 0	1	0	1	2	748	4	0	1	0	0	1	0	0	0	16	2	3	3	18	0	0	0	0	0	0	
б	- 18	12	2	1	3	3	611	0	0	6	0	0	0	1	3	1	127	0	9	0	0	0	1	0	2	0	
٩	- 7	4	0	2	0	0	0	746	0	0	3	9	6	13	0	0	0	1	0	1	4	0	3	1	0	0	
	- 0	1	1	1	1	1	2	0	619	11	0	157	0	0	0	0	0	1	0	0	0	1	1	1	0	2	
	- 0	1	0	6	0	1	6	1	26	739	0	2	0	0	0	0	0	0	5	6	2	1	0	1	3	0	
~	- 1	4	0	0	2	1	0	13	1	0	753	5	0	2	0	0	0	5	0	3	0	1	0	6	1	2	
_	- 0	2	5	0	0	1	0	3	190	0	0	594	0	0	1	0	1	0	0	1	0	0	0	0	2	0	
a E	- 0	0	0	0	0	0	0	3	0	0	0	0	777	10	0	3	0	1	0	0	2	0	4	0	0	0	
True	- 7	0	0	5	0	0	0	9	0	0	1	0	13	750	0	0	0	4	0	0	2	2	5	2	0	0	
0	- 1	3	4	11	0	0	0	0	0	0	0	0	0	1	773	1	3	0	0	0	3	0	0	0	0	0	
۵	- 1	0	0	3	1	7	1	0	0	0	0	0	0	0	1	783	0	3	0	0	0	0	0	0	0	0	
ь	- 25	2	0	2	2	0	73	0	1	1	0	0	0	1	9	5	670	1	0	3	2	0	0	0	3	0	
_	- 5	0	2	0	5	3	0	0	1	0	7	1	1	2	0	3	1	743	0	8	0	11	0	3	2	2	
s	- 1	1	1	0	1	0	12	1	0	9	1	0	0	1	0	0	0	0	772	0	0	0	0	0	0	0	
4	- 1	2	2	0	2	5	0	1	3	3	5	2	0	0	1	0	0	4	0	763	0	0	0	2	2	2	
5	- 2	0	1	1	0	0	1	1	0	2	1	1	2	3	1	0	1	1	1	0	746	27	7	0	1	0	
>	- 0	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	8	0	2	31	743	0	1	11	0	
>	- 0	0	0	1	0	0	0	1	0	2	2	0	5	10	0	0	0	0	0	0	7	0	771	0	1	0	
×	- 2	0	0	2	0	0	0	1	0	1	16	0	0	1	0	0	0	0	0	2	0	3	1	760	9	2	
>	- 0	0	0	1	0	0	7	1	0	8	0	0	0	0	0	2	3	1	0	9	1	11	0	5	751	0	
Z	- 4	0	0	1	2	0	3	0	1	1	0	0	0	0	0	0	1	0	1	5	0	0	0	3	0	778	
	a	b	Ċ	ď	ė	f	g	h	i	j	k	i	m	'n	0	p	q	r	S	ť	ů	v	w	X	y	Z	

Predicted