MT Exercise 3
Recurrent networks

Link to 'ex3' repository: https://github.com/sabrinabraendle/mt-exercise-3

Training perplexity after each epoch

Train. perplexity	dropout 0	dropout 0.3	dropout 0.5	dropout 0.7	dropout 1
Epoch 1	251.43	260.83	275.33	308.2	464.75
Epoch 2	114.1	129.76	148.67	189.31	428.07
Epoch 3	83.55	99.61	116.31	158.08	418.49
Epoch 4	68.02	84.45	100.64	140.97	414.37
Epoch 5	57.38	74.67	91.06	131.23	412.15
Epoch 6	49.04	67.75	85.02	123.69	410.8
Epoch 7	41.77	62.18	79.72	118.65	409.91
Epoch 8	35.51	57.64	76.53	114.47	409.29
Epoch 9	30.42	54.07	72.94	111.49	408.85
Epoch 10	26.46	51.49	70.38	108.48	405.55
Epoch 11	23.28	48.78	68.72	106.8	405.55
Epoch 12	20.75	46.59	66.66	104.77	405.55
Epoch 13	18.77	44.59	64.94	103.48	405.54
Epoch 14	17.23	43.04	63.7	100.96	405.51
Epoch 15	16.03	41.52	62.8	100.62	405.48
Epoch 16	14.95	40.18	61.23	99.33	404.71
Epoch 17	14.09	39.06	60.52	98.24	404.73
Epoch 18	13.38	37.81	59.5	97.71	404.45
Epoch 19	12.7	37.11	58.33	96.61	404.47
Epoch 20	12.07	36.14	57.64	96.17	404.49
Epoch 21	11.67	35.45	56.69	95.8	404.5
Epoch 22	11.23	34.81	56.57	95.14	404.51
Epoch 23	10.89	34.04	55.57	94.69	404.41
Epoch 24	10.51	33.5	54.68	93.99	404.41
Epoch 25	10.31	32.89	54.53	93.48	404.42
Epoch 26	9.95	32.36	54.09	92.78	404.42
Epoch 27	9.66	31.82	53.74	91.81	404.43
Epoch 28	9.48	31.4	53.02	91.19	404.43
Epoch 29	9.23	31.11	52.5	91.27	404.43
Epoch 30	9.03	30.76	52.4	90.89	404.44
Epoch 31	8.89	30.53	51.66	89.88	404.44
Epoch 32	8.63	29.99	51	90.8	404.44
Epoch 33	8.56	29.85	51.25	89.76	404.44
Epoch 34	8.45	24.92	51.05	89.26	404.44
Epoch 35	8.25	24.12	50.52	89.2	404.45
Epoch 36	8.04	23.63	50.14	82.03	404.45
Epoch 37	8.01	23.04	49.75	80.32	404.45
Epoch 38	7.89	22.8	49.44	78.78	404.45
Epoch 39	7.75	22.58	49.27	78.06	404.42
Epoch 40	5.28	22.36	49.2	77.19	404.42

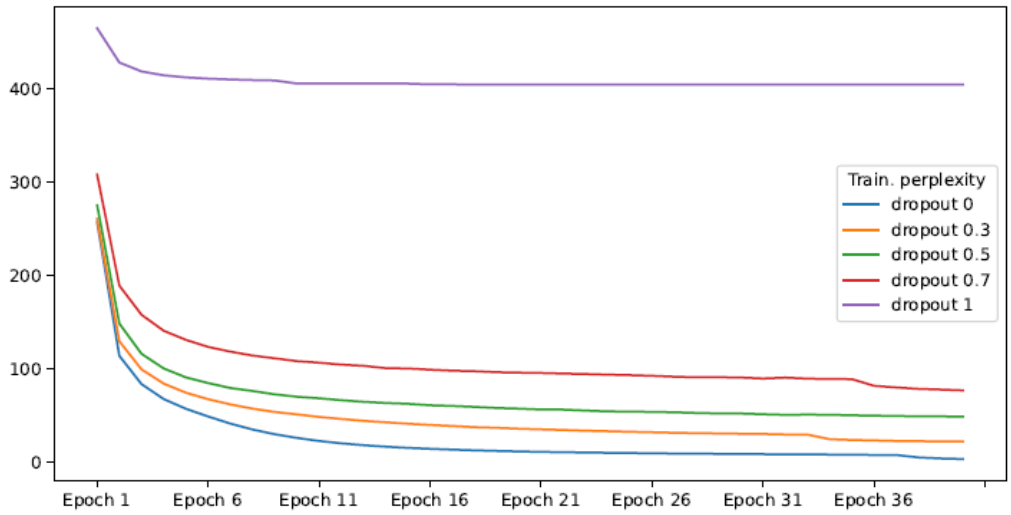
Validation perplexity on the validation set after each epoch

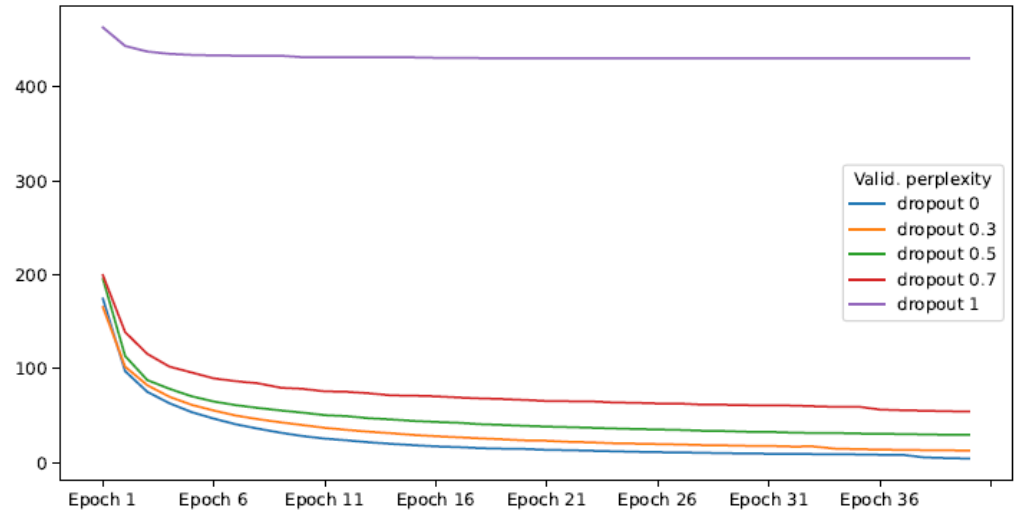
Valid. perplexity	dropout 0	dropout 0.3	dropout 0.5	dropout 0.7	dropout 1
Epoch 1	186.16	165.24	195.47	199.31	463.2
Epoch 2	96.17	101.9	113.23	138.69	443.49
Epoch 3	78.86	82.12	87.6	115.48	437.53
Epoch 4	65.72	69.79	78.29	101.9	435.07
Epoch 5	53.86	61.21	70.35	95.68	433.94
Epoch 6	46.37	55.14	64.74	89.39	433.4
Epoch 7	40.28	49.76	60.86	86.39	433.17
Epoch 8	34.59	45.93	57.92	84.12	433.1
Epoch 9	30.43	42.63	55.27	79.51	433.13
Epoch 10	27.74	39.69	52.91	78.25	431.48
Epoch 11	24.92	36.72	50.26	75.59	431.4
Epoch 12	22.58	34.54	49.11	75.11	431.36
Epoch 13	21.06	32.56	46.95	73.48	431.34
Epoch 14	19.66	30.99	45.67	71.33	431.33
Epoch 15	18.11	29.15	44.1	70.97	431.33
Epoch 16	16.77	27.81	43.01	70.32	430.86
Epoch 17	16.07	26.67	42.15	69.07	430.86
Epoch 18	15.24	25.56	40.63	68.07	430.52
Epoch 19	14.38	24.51	39.81	67.41	430.43
Epoch 20	13.62	23.37	38.86	66.44	430.4
Epoch 21	12.85	22.98	38.07	65.32	430.4
Epoch 22	12.14	21.78	37.46	65.08	430.4
Epoch 23	11.6	21.29	36.79	64.88	430.37
Epoch 24	11.17	20.27	36.09	63.78	430.34
Epoch 25	10.87	19.92	35.44	63.36	430.32
Epoch 26	10.68	19.49	35.02	62.69	430.3
Epoch 27	10.25	19.02	34.48	62.65	430.29
Epoch 28	9.93	18.36	33.65	61.35	430.28
Epoch 29	9.58	18.09	33.33	61.31	430.28
Epoch 30	9.31	17.6	32.54	60.9	430.27
Epoch 31	9.13	17.47	32.42	60.56	430.27
Epoch 32	8.78	16.84	31.68	60.49	430.27
Epoch 33	8.64	16.9	31.22	59.75	430.27
Epoch 34	8.41	14.53	31.22	59.1	430.26
Epoch 35	8.24	14	30.69	59.34	430.26
Epoch 36	8.09	13.56	30.37	56.2	430.26
Epoch 37	7.81	13.3	30.2	55.41	430.26
Epoch 38	7.69	12.98	29.72	55	430.26
Epoch 39	7.71	12.74	29.33	54.49	430.26
Epoch 40	5.03	12.52	29.21	54.04	430.26

Test perplexity on the test set as the very last step in training

Test perplexity	dropout 0	dropout 0.3	dropout 0.5	dropout 0.7	dropout 1
Epoch 40	5.29	13.37	30.62	55.39	415.02

Create a line chart each for the training and the validation perplexity to visualize the results.





Can you see a connection between the training, validation, and test perplexity? Based on your results, which dropout setting do you think is the best and why?

In all sets it is observed that as the dropout rate increases the perplexity value increases as well. Dropout rate 0.0 gives the lowest test perplexity score, so given our model and dataset it works the best. If the neural network was deeper (more than 2 layers, which is the default, and more than 200 units in the hidden layer) maybe a higher dropout rate would yield better results.

Sample some text from your best model (the one that obtains the lowest test perplexity), for instance by changing the script scripts/generate.sh. What do you think of its quality? Does it resemble the original training data?

The vocabulary is matched quite well, and some parts of the generated text make sense syntactically. Nevertheless, the sentences as a whole do not have meaning yet. Therefore, despite the fact that the vocabulary and style resemble the training data, the quality is not entirely met with this model.

Link to 'examples' repository: https://github.com/sabrinabraendle/examples