

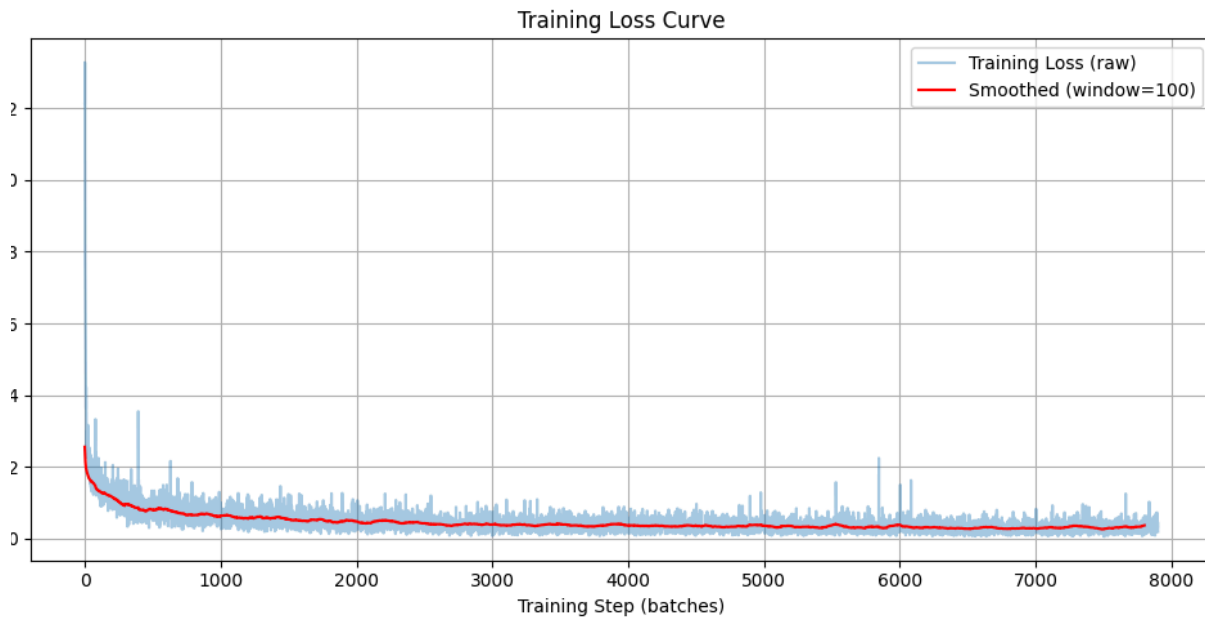
Deep Learning Lab Exercise 1

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1. Experimenting with Diffusion Model



2. Image Generation:

2.1.2. Topk sampling with different temperatures

In topk sampling, we select k most likely samples and then sample from these samples according to most likely probabilities. With lower temperatures the model favours the most likely tokens even stronger, leading to better output.

2.1.3. Prompt Engineering

Experimenting with different prompts using hyperparameters Topk=50 and temperature=0.7

| Prompt | BLEU Score |
|------------------------------|------------|
| a picture showing (baseline) | 7.11% |
| an image showing | 6.07% |

| | |
|---------------------------------------|-------|
| a clear photo of | 6.37% |
| a high-quality image of | 5.97% |
| “ ” (Empty String) | 5.56% |
| a detailed view describing accurately | 1.94% |
| this is a picture of | 5.44% |

Conclusion: It appears that short concise to the point prompt yielded the best BLEU score.

2.1.4. Hyperparameter Search

| Search Method | Topk | Temp | BLEU score |
|---------------|------|------|------------|
| Greedy Search | N/A | 1.0 | 28% |
| TopK | 50 | 0.7 | 7.11% |
| TopK | 50 | 0.3 | 10.23% |
| TopK | 100 | 0.3 | 10.75% |
| TopK | 100 | 0.7 | 6,64% |

2.2.3. Finetune

| Learning Rate | Weight decay | Temp | image-to-text R@1 |
|---------------|--------------|------|-------------------|
| 1e-3 | 1e-3 | 0.1 | 43% (Baseline) |
| 1e-4 | 0.01 | 0.05 | 27% |
| 1e-3 | 0 | 0.1 | 44% |
| 1e-5 | 0 | 0.1 | 59% |