

GANs for Natural Language Generation

BACKGROUND: GANs have achieved impressive results in computer image generation. However, language-related tasks are a relatively new problem space due to the architecture’s poor performance on discrete data.

METHODS

- 1. Dataset: subset of 250,000 sentences from News Crawl 2009
- 2. Evaluation Metrics:
 - a. BERT Perplexity: well-formedness
 - b. BLEU Score: sentence diversity
- 3. Baseline: WGAN 2, 50-dim. GloVe embeddings
- 4. Higher-Dimensional Embeddings
- 5. Different types of embeddings
- 6. Hyperparameter tuning
 - a. Ratio of discriminator to generator training iterations
 - b. Discriminator learning rate

RESULTS

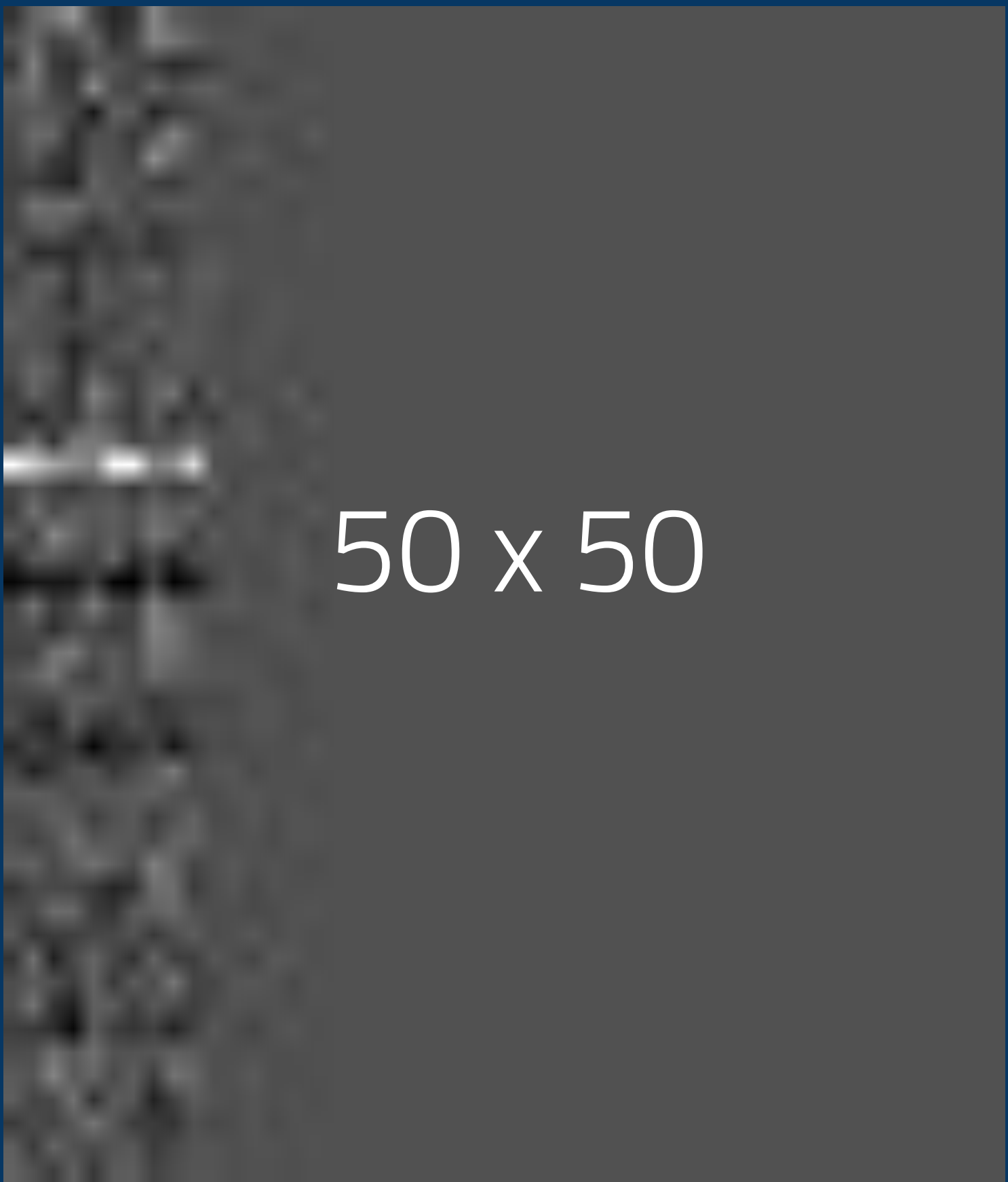
Model	BLEU Score	BERT Perplexity
50 x 50 GloVe	0.0078	19197.44
50 x 50 Spherical	0.0079	50625777.318
100 x 50 GloVe	0.0077	3759.55
100 x 50 Spherical	0.0078	1077800.97

Ratio of d to g training iterations	BLEU Score	BERT Perplexity
5:1	0.0077	3759.55
3:2	0.0079	28234.965
2:2	0.0127	10787.72
1:2	0.0103	5556.70

https://github.com/adalmia96/DL_Project

By introducing a GAN that can use non-square matrices as input, higher-dimensional embeddings with reasonable memory requirements can be leveraged to improve coherence of natural language generated sentences.

“Image” dimensions	BLEU Score	BERT Perplexity
50 x 50	0.0078	19197.44
100 x 100	0.0079	47411.16
100 x 50	0.0077	3759.55
200 x 50	0.0082	22882.45



GloVe 50 x 50

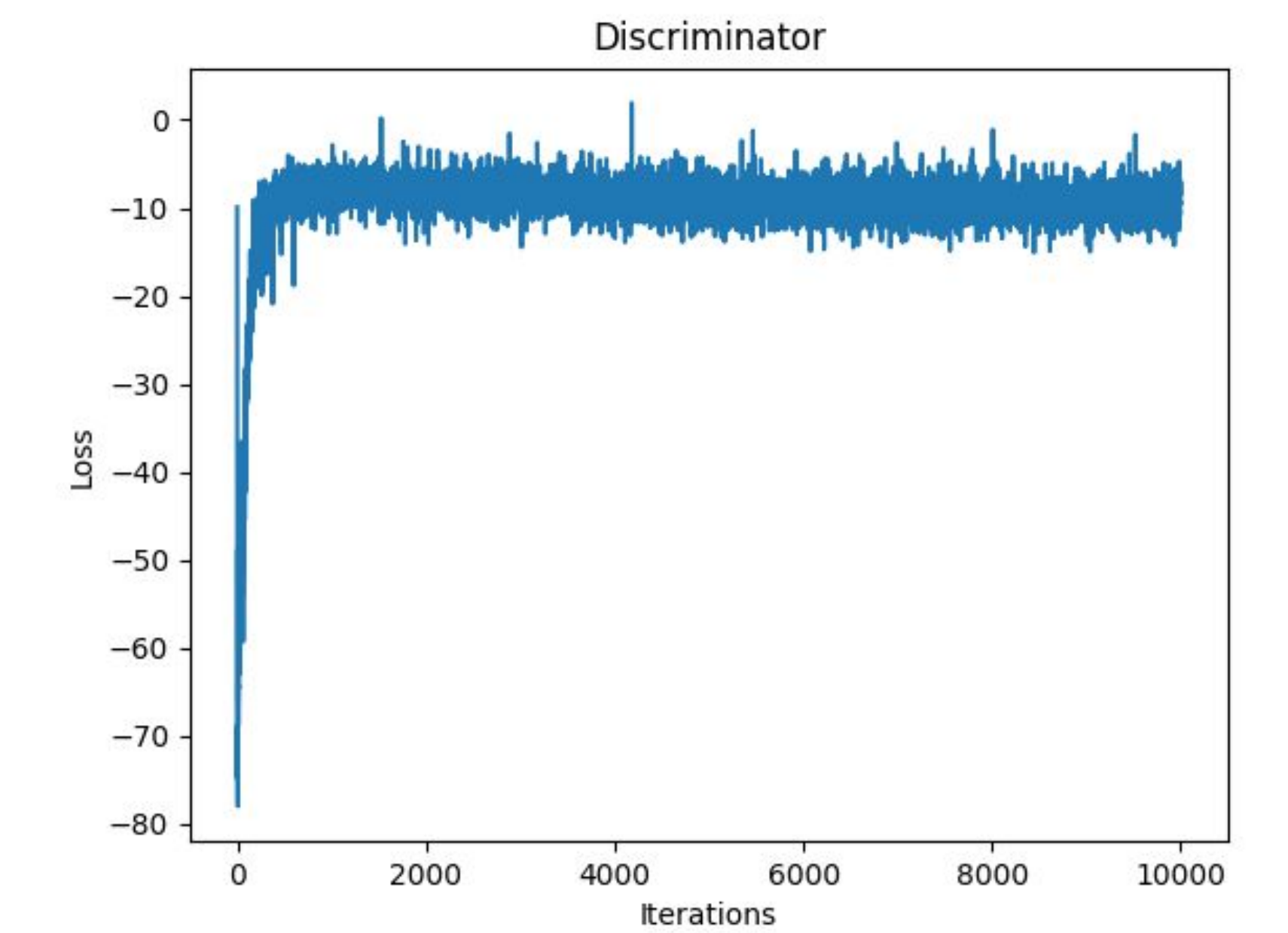
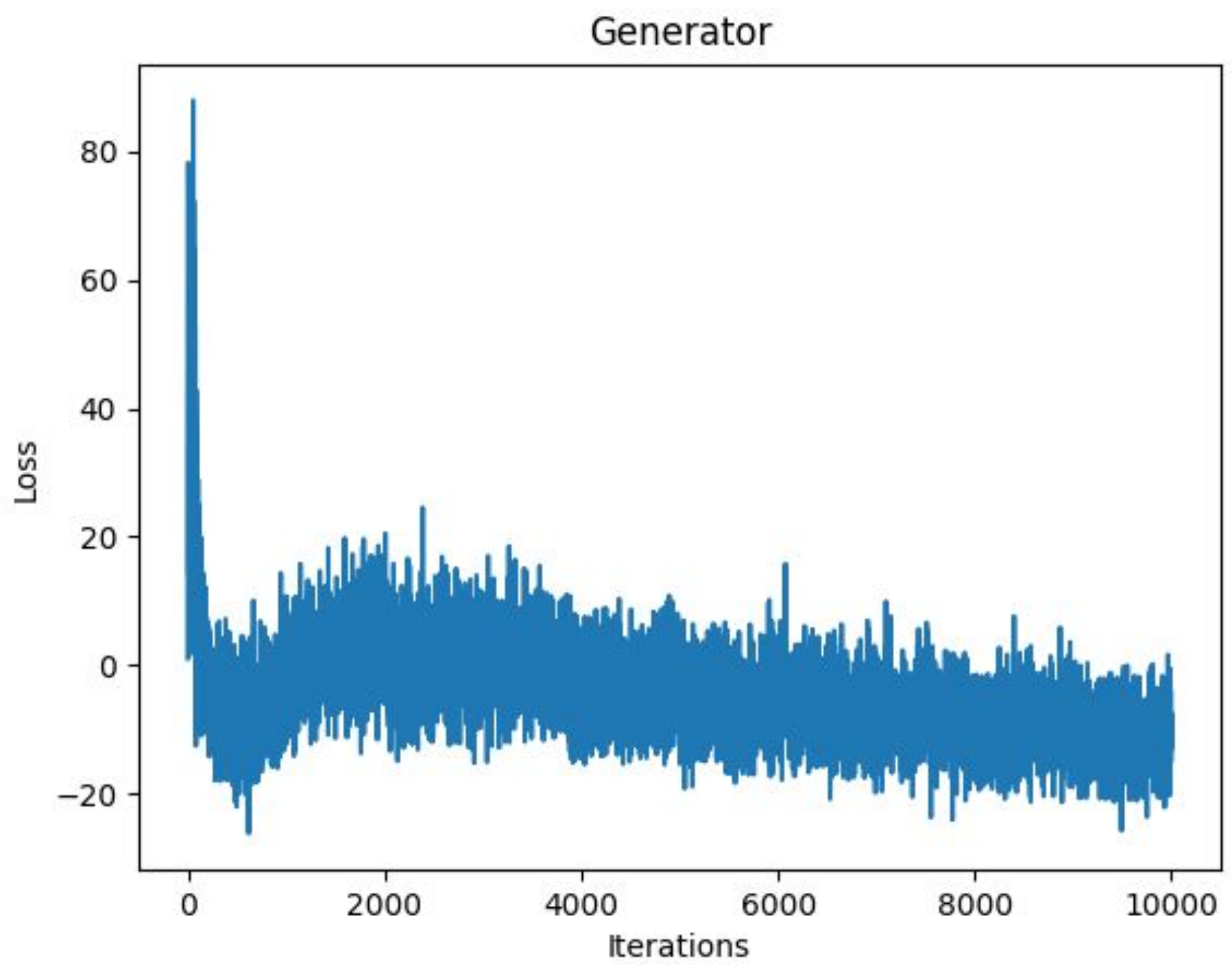
- he turned the line he , in , in he saw put offer wolfsburg , , sweden while but but never . yaroslavsky ntuli
- the union week increase up put higher 2.25 balance of points present rose same inches vaulted 27-nation one same the the 5 as the nation amertil monetary make which the contractors

GloVe 100 x 50

- `` . is this understood , seems ambivalent would . life ..
- the after of meanwhile fall one change change the from the we just both the the for the no , agenda . but having , come however `` , wake herminator , still when 1771 ..

NOTES

- GloVe: trained on statistical co-occurrences
- Spherical: trained on the unit circle
 - Vocabulary 5x size of GloVe’s
 - Large vocabulary exploration may cause overuse of uncommon words
 - Spherical 50 x 50: impracticable vermeer ronglu ours continental colourist and answerable keenly , crude and anything . all and crueltye
- Discriminator learns too quickly



FUTURE WORK

- 1. Contextual Vectors
- 2. Vocabulary size of embedding space
- 3. Negative training example

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