Homework Assignment 4 – [30 points]

STAT437 Unsupervised Learning – Spring 2025

Due: Friday, February 21 on Canvas

Reference the attached Jupyter notebook for the case study 1 and 2 questions.

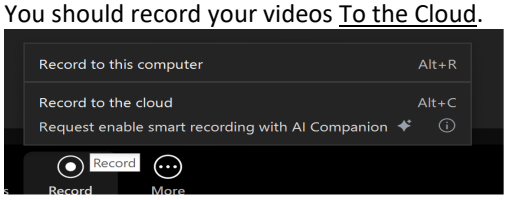
Video Question: Make a 3+ minute video explaining your answers to **case study 1 and 2.** Make sure to show off your Jupyter notebook answers as you are going through your explanation. This doesn't have to be any longer than ~6 minutes.

IMPORTANT Video Element of ALL Homework Assignments:

- In order to receive points for each video submission, you need to do **ALL** of the following.
  - Have your camera on.
  - Show your notebook with your FULL screen in Zoom (not just a particular application).
  - We should be able to hear the audio. Make sure to turn your mic on.
  - You should give a good faith attempt to answer the prompt.
  - Your video meet the minimum time requirement.
  - It should not sound like you are just reading off a script.
  - It's ok if your video recording is not the most eloquent. What's important is that you are putting together YOUR authentic thoughts on your particular understanding of the assignment and the lecture content.

How to Submit Videos:

- You should record your videos in your UIUC Zoom client.
- You should record your videos To the Cloud.



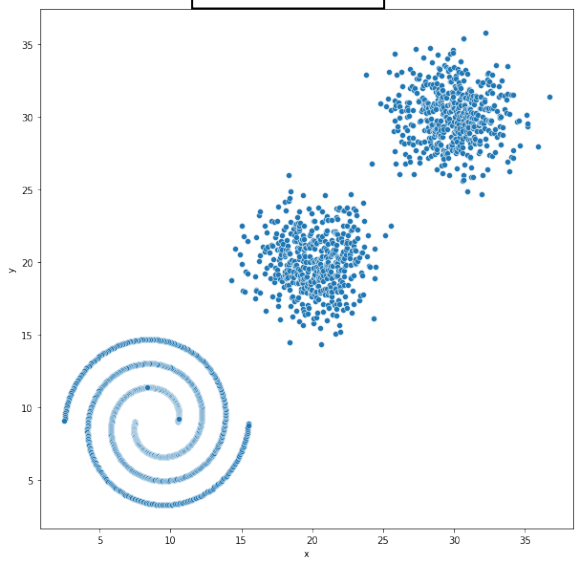
- You can find your recording link at https://illinois.zoom.us/recording/.
- Click on the corresponding video and Copy shareable link to paste the link in Canvas.

Question	Points
Video Question	
	1
Pdf Questions	
1	3
Case Study 1 Questions	
1.1	0.25
1.2	0.5
2.1	1.5
2.2	2.5
2.3	0.75
2.4	0.5
2.5	0.5
2.6	0.5
3.1	1
3.2	0.5
3.3	0.5
3.4	0.5
4.1	1
4.2	0.5
4.3	0.5
4.4	0.5
5.1	0.5
5.2	0.5
5.3	0.5
5.4	0.5
Case Study 2 Questions	
1.1.1	0.25
1.1.2	1
1.1.3	0.25
1.2.1	0.25
1.2.2	1
1.2.3	0.25
2.1.1	0.25
2.1.2	1
2.1.3	0.25
2.2.1	0.25
2.2.2	1
2.2.3	0.25
3.1.1	0.25
3.1.2	1
3.1.3	0.25
3.2.1	0.25
3.2.2	1
3.2.3	0.25
4.1.1	0.25
4.1.2	1
4.1.3	0.25
4.2.1	0.25
4.2.2	1
4.2.3	0.25

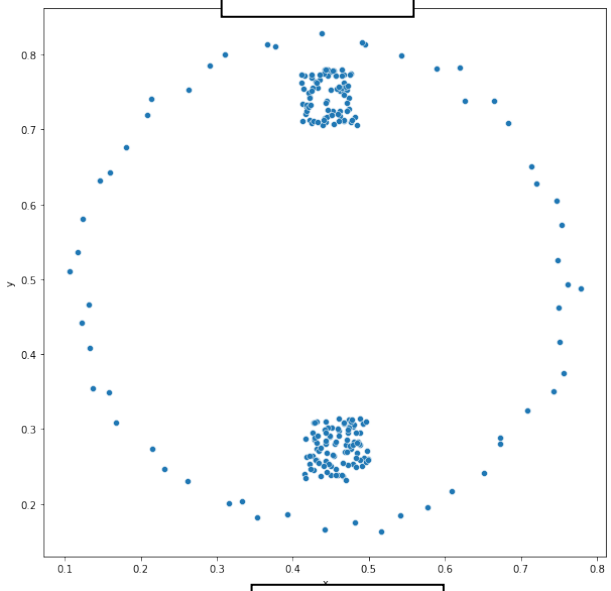
Question #1:

Match the original datasets below (1-10) to the corresponding set of t-SNE plots (A-J).

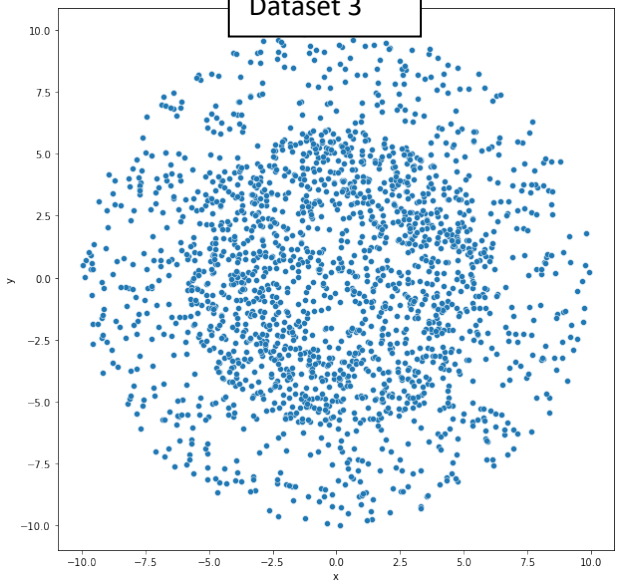
Dataset 1



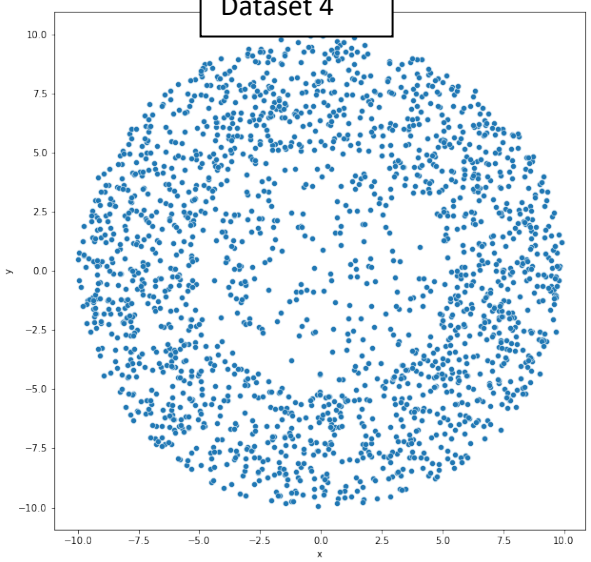
Dataset 2



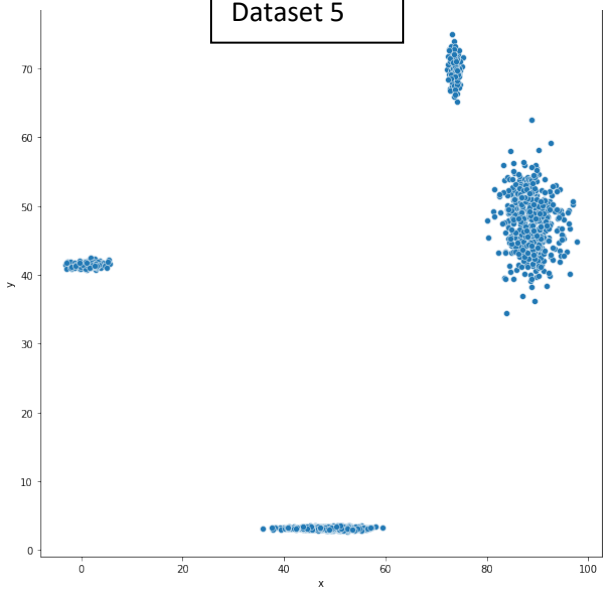
Dataset 3



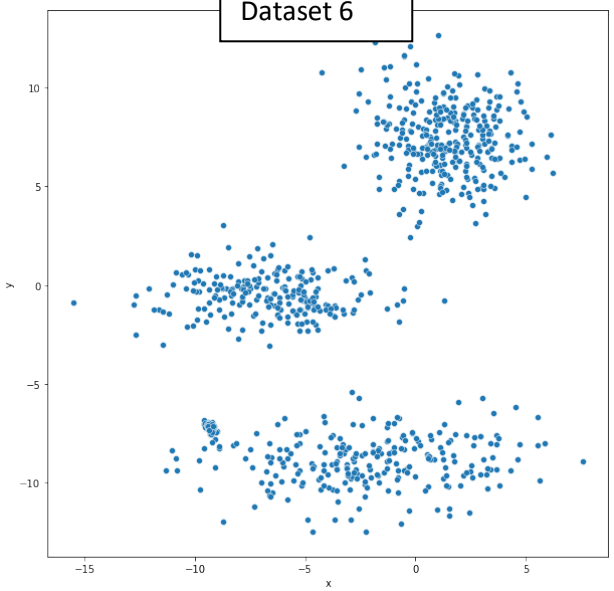
Dataset 4



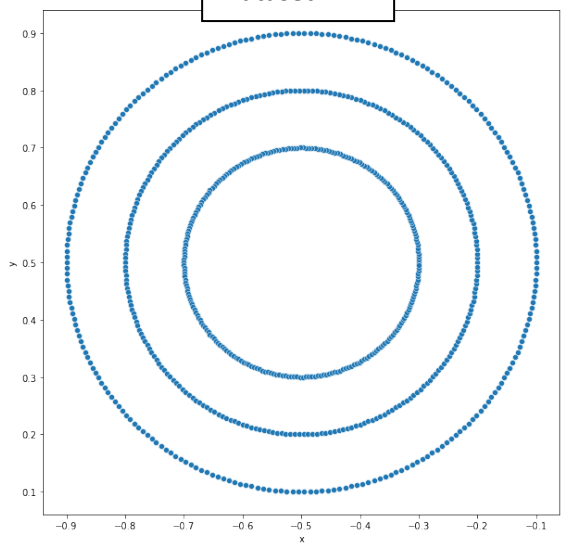
Dataset 5



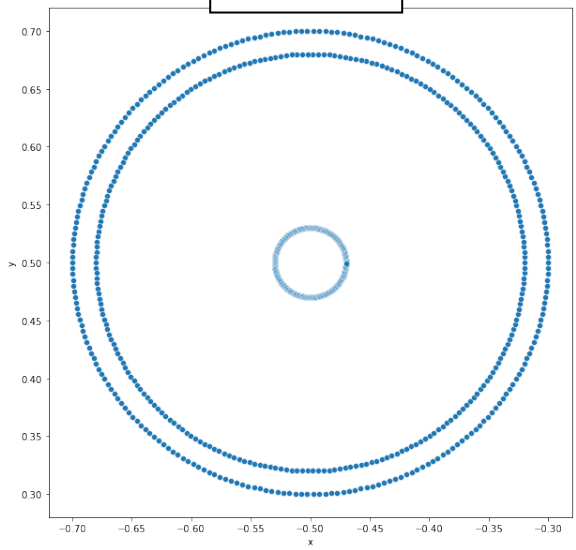
Dataset 6



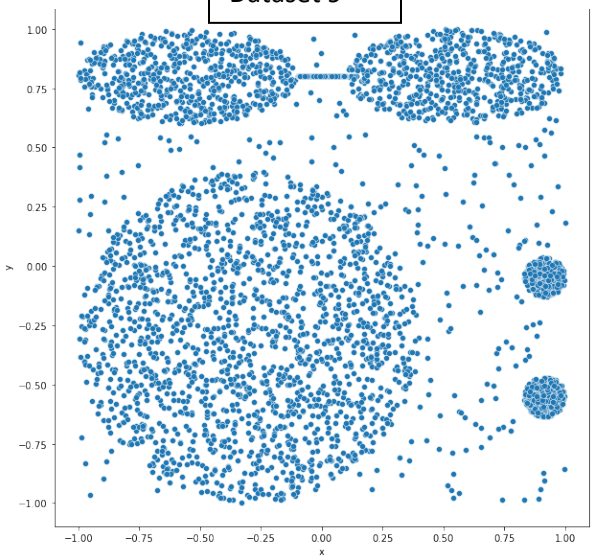
Dataset 7



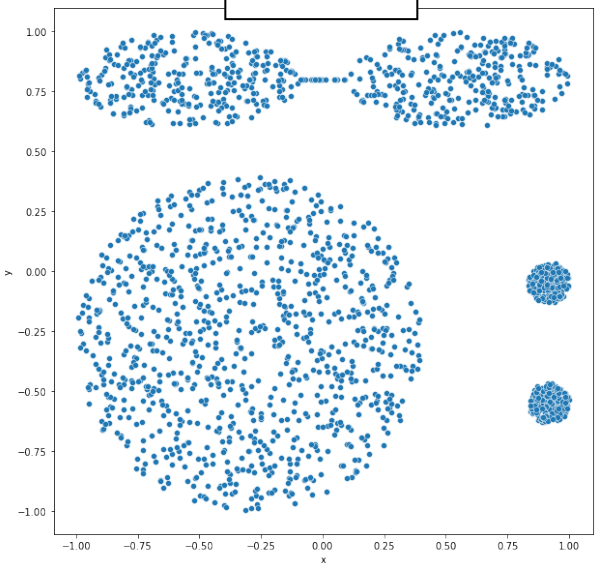
Dataset 8

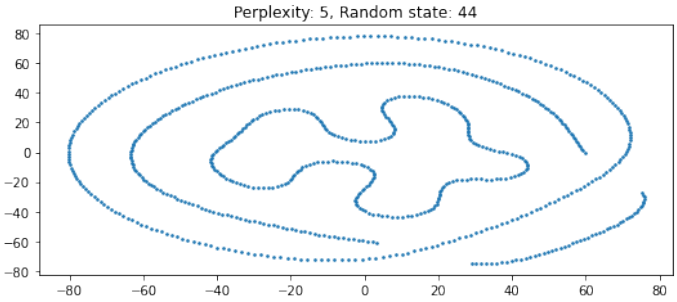


Dataset 9



Dataset 10

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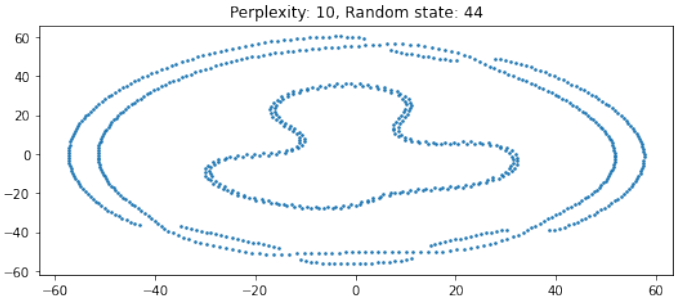
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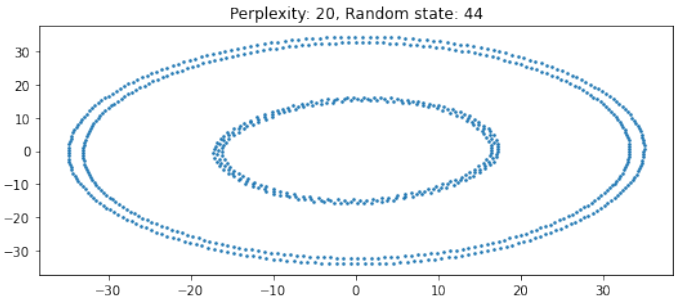
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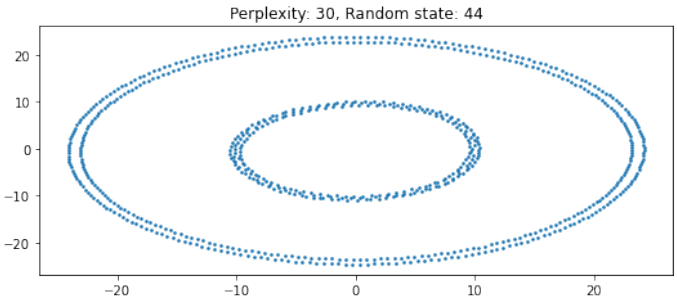
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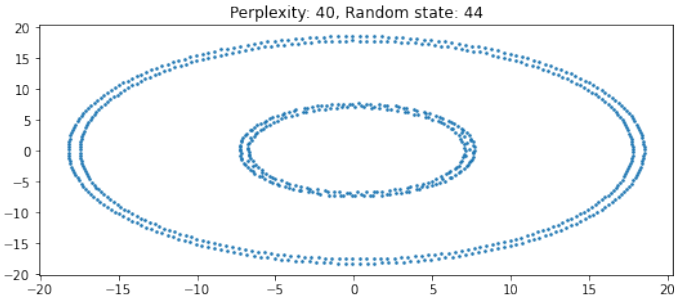
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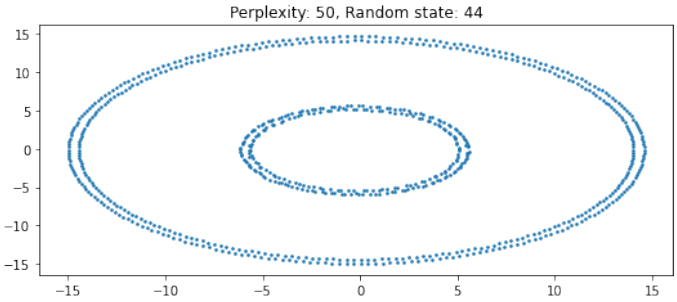
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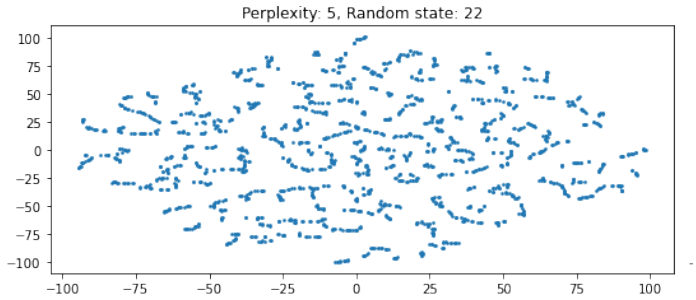
Set A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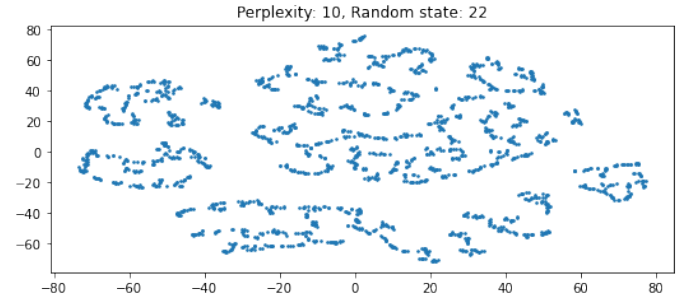
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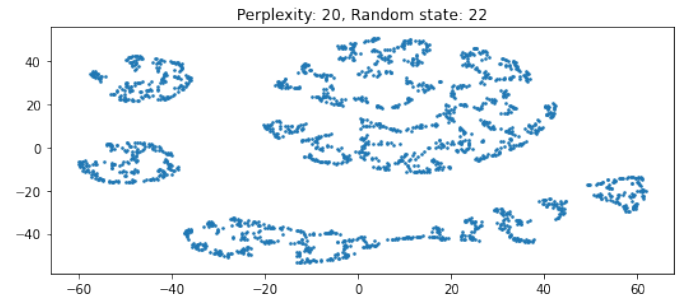
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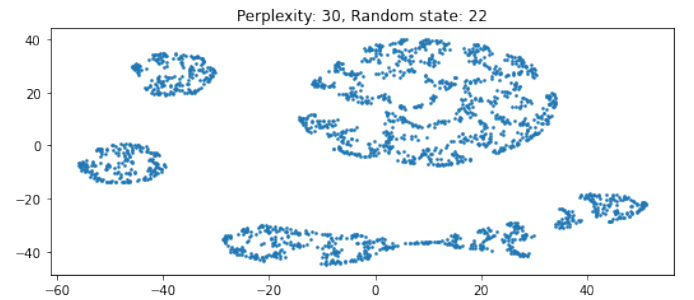
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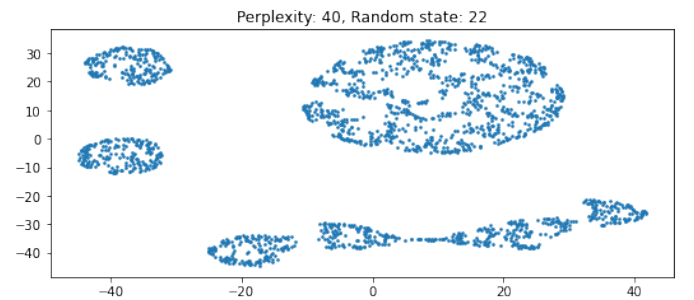
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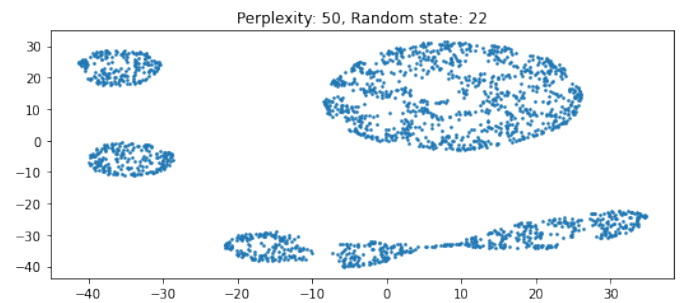
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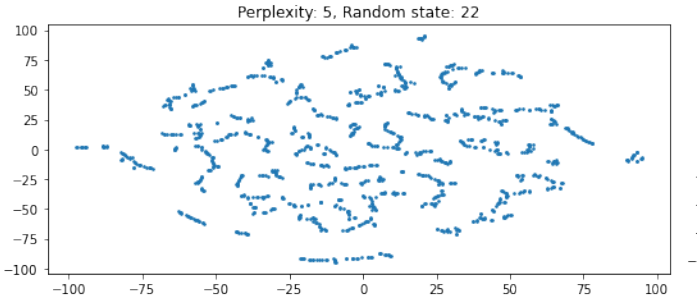
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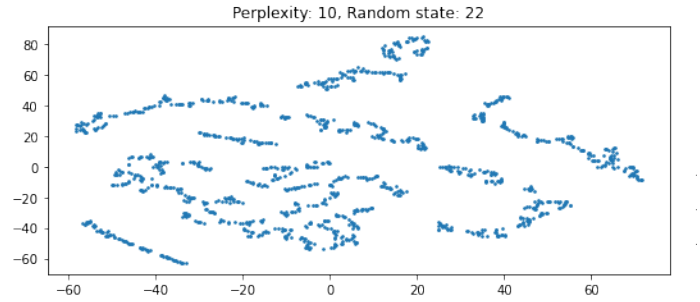
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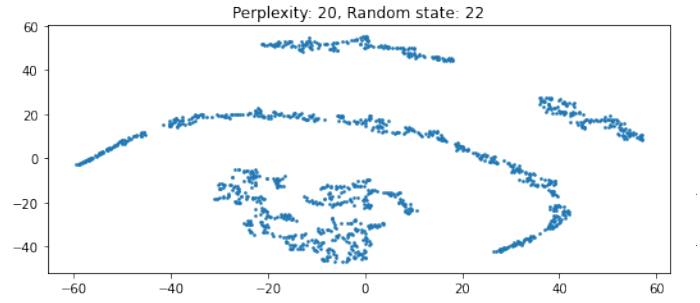
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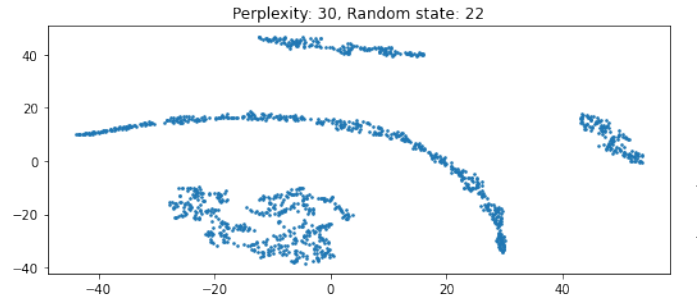
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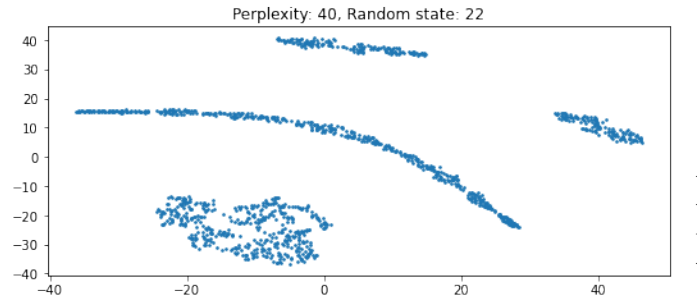
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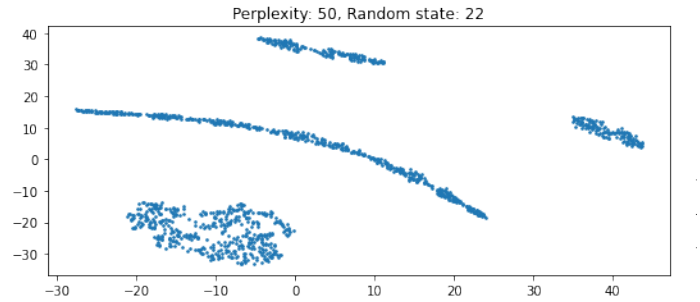
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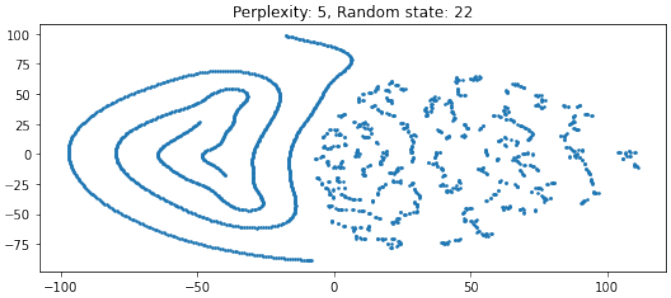
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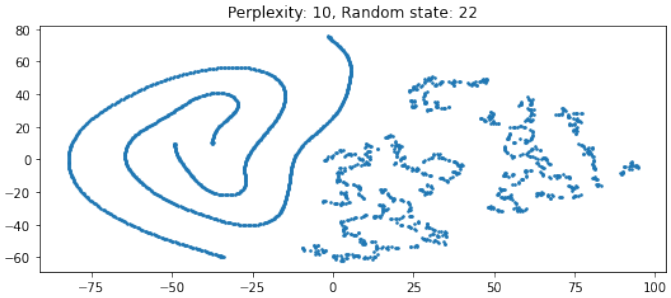
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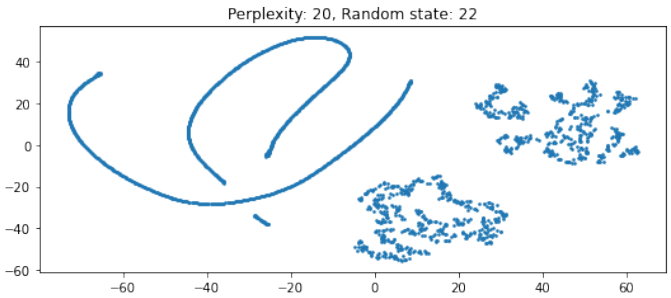
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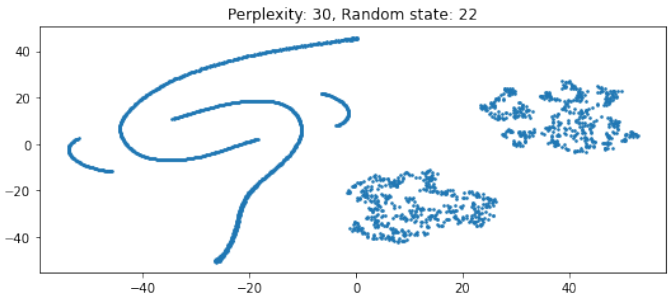
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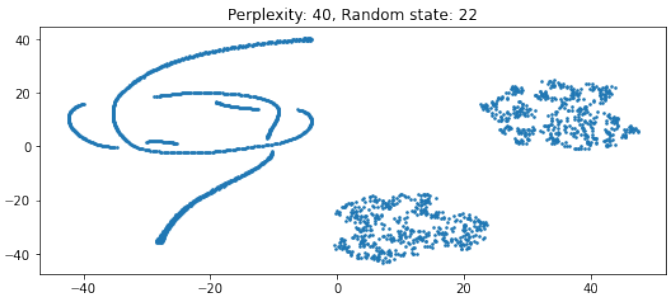
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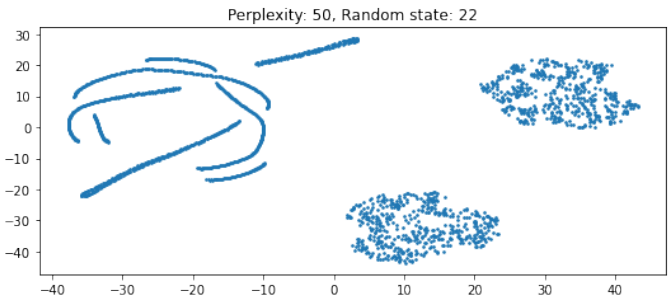
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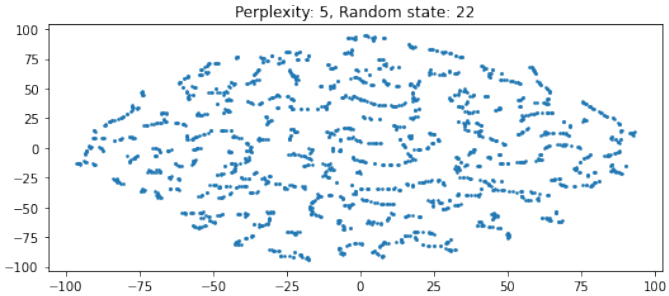
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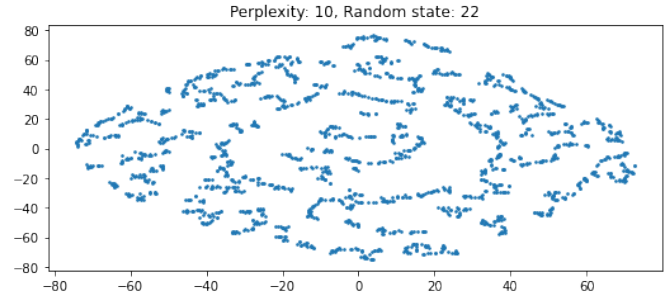
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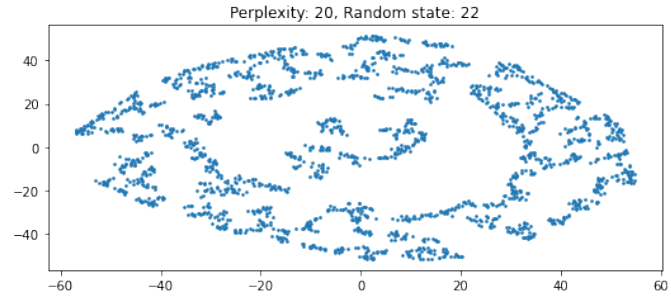
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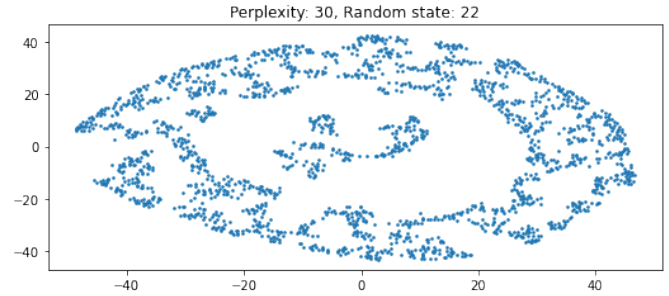
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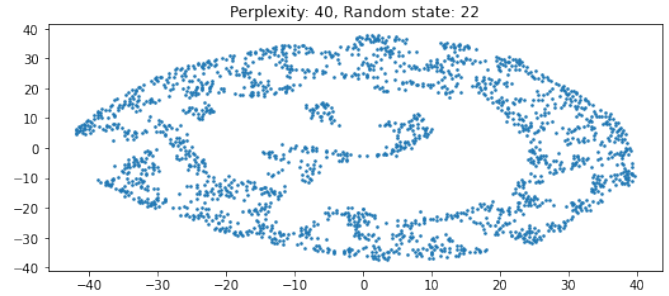
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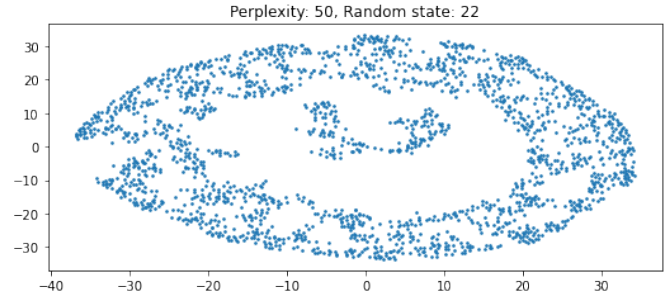
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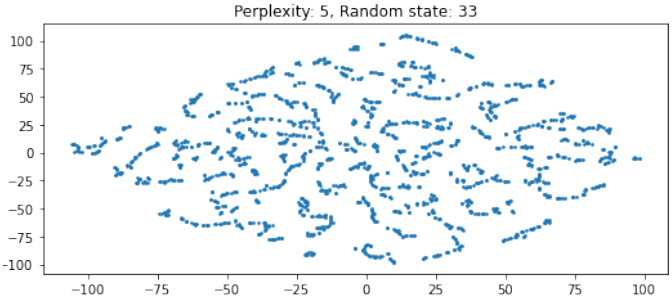
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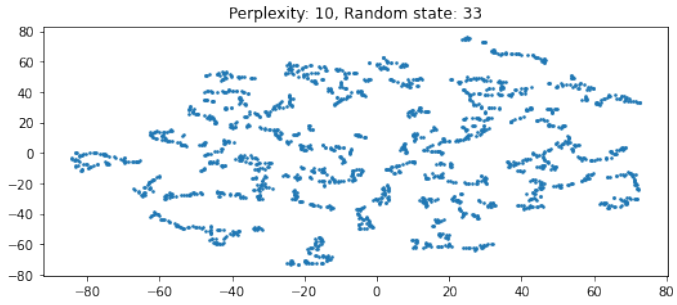
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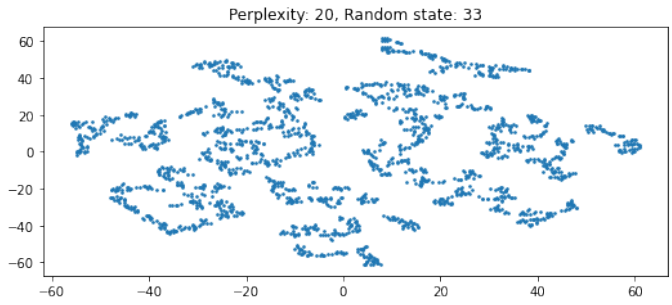
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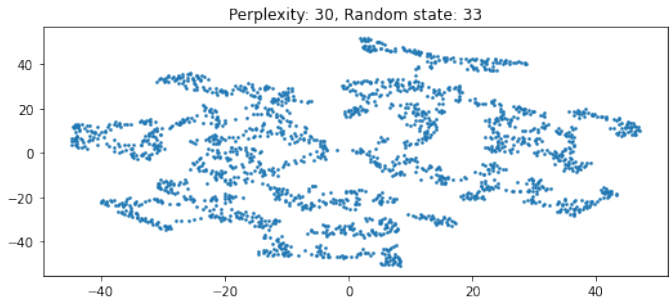
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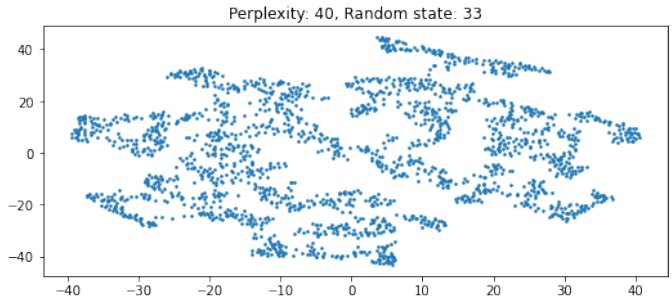
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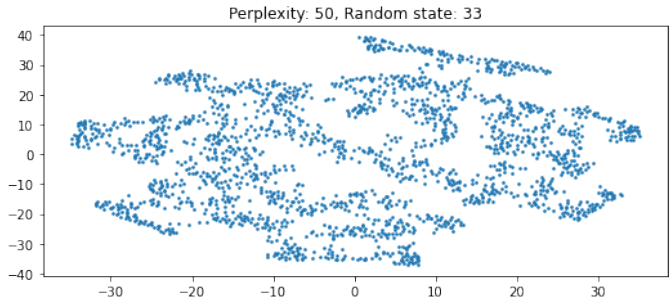
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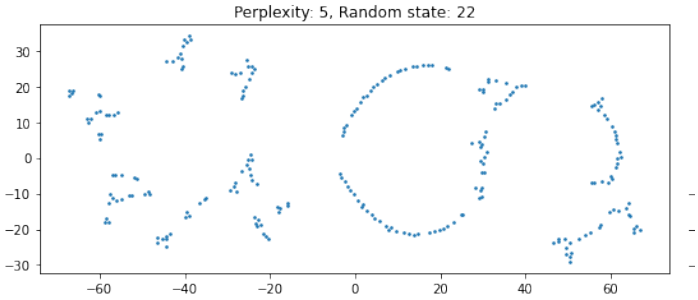
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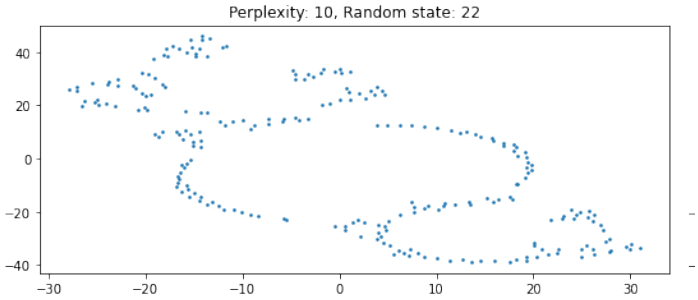
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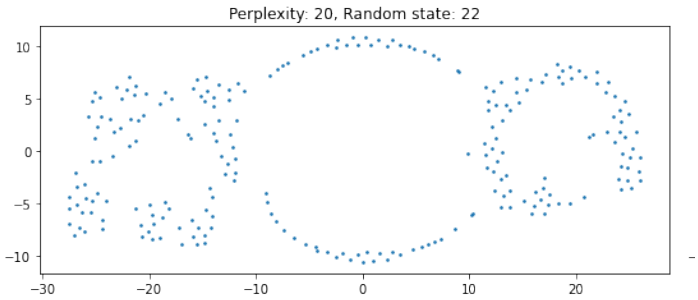
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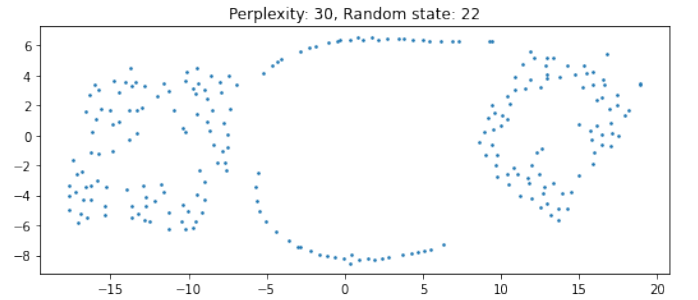
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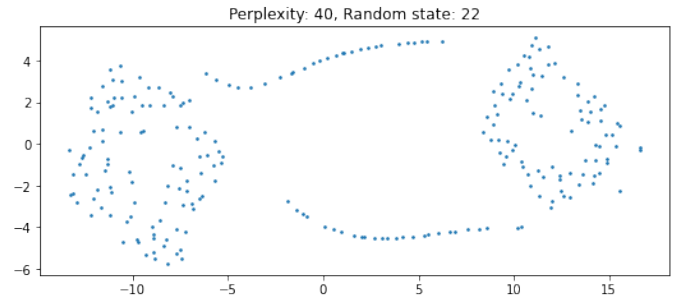
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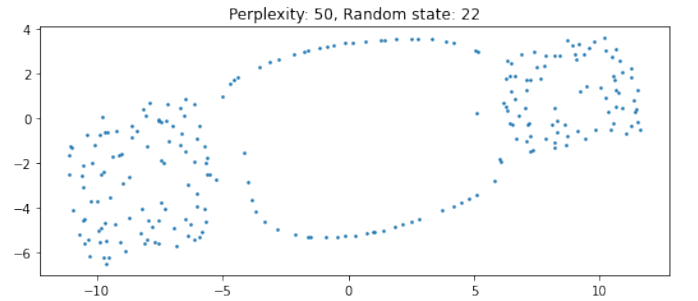
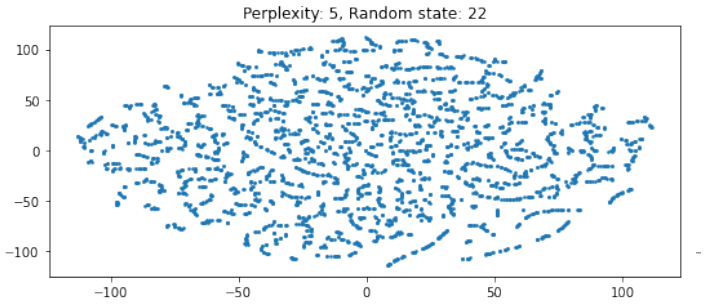
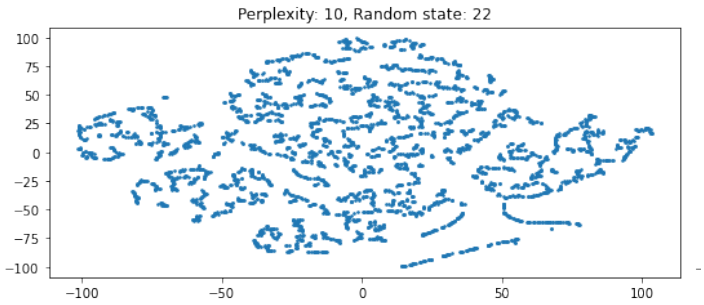
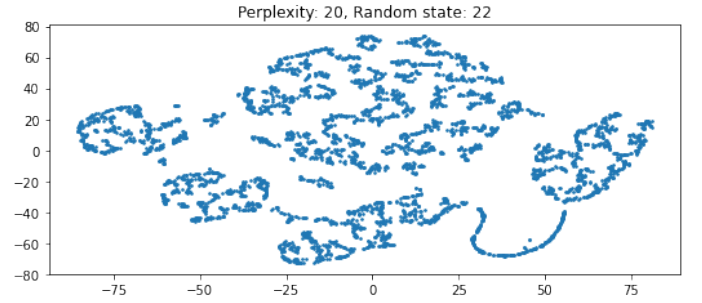
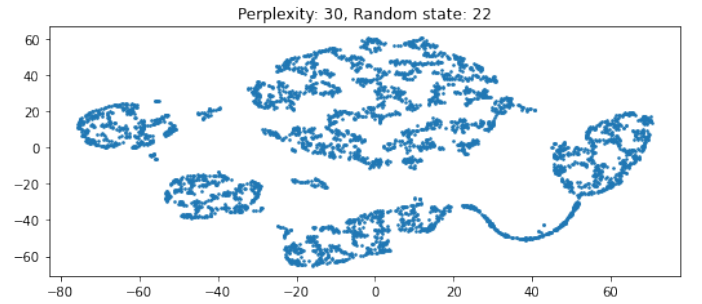

Perplexity: 50, Random state: 22

Set G


Perplexity: 5, Random state: 22


Perplexity: 10, Random state: 22


Perplexity: 20, Random state: 22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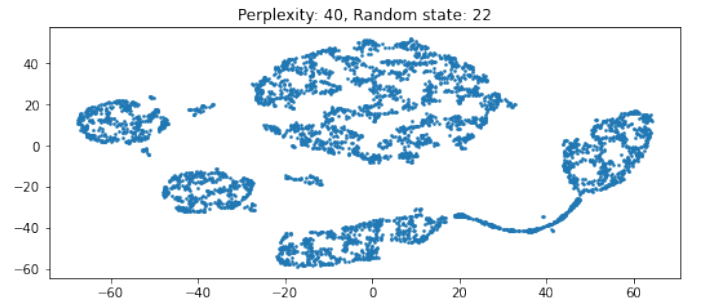
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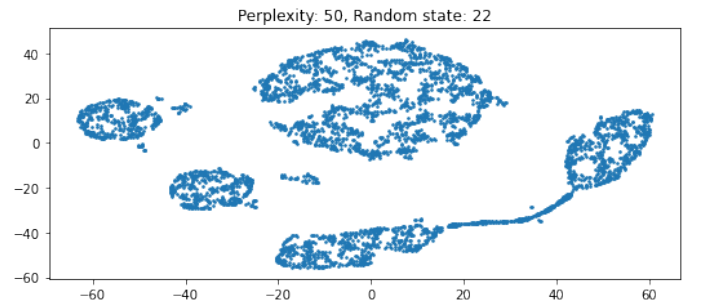
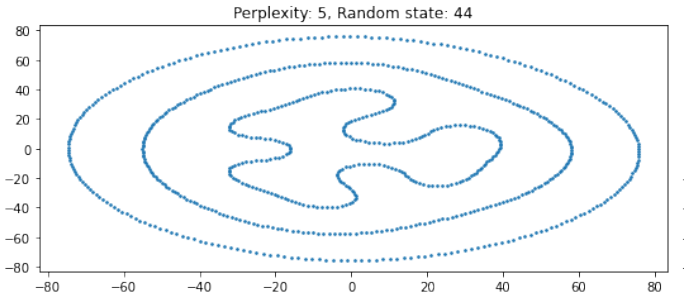
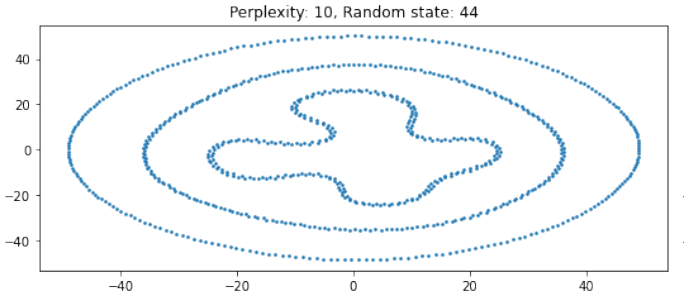
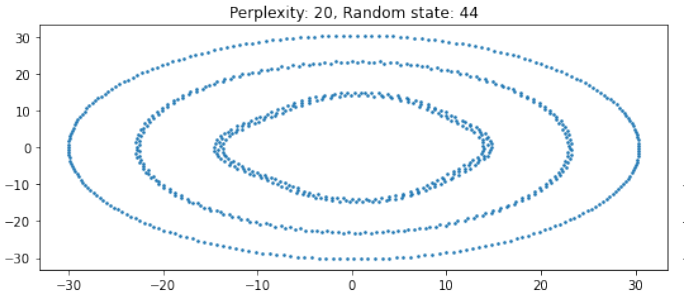

Perplexity: 50, Random state: 22

Set H


Perplexity: 5, Random state: 44


Perplexity: 10, Random state: 44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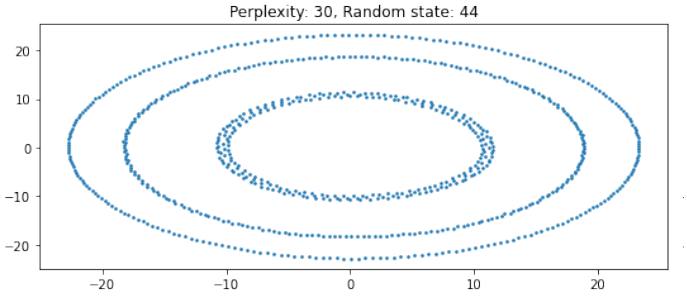
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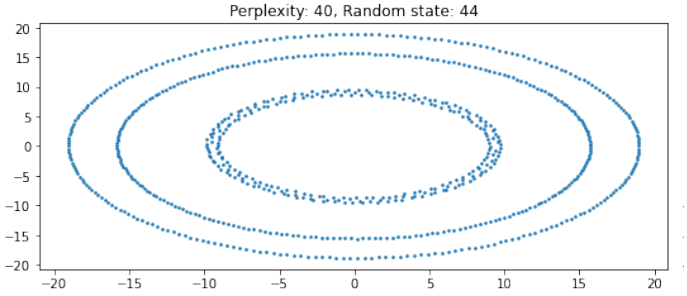
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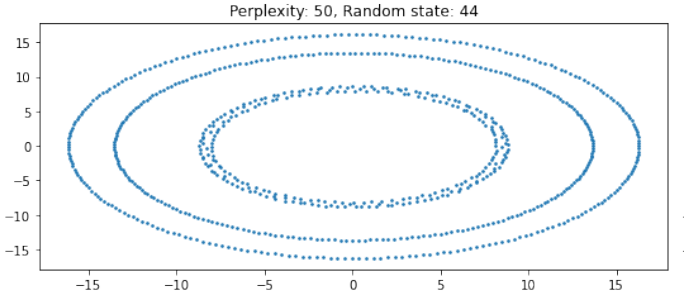
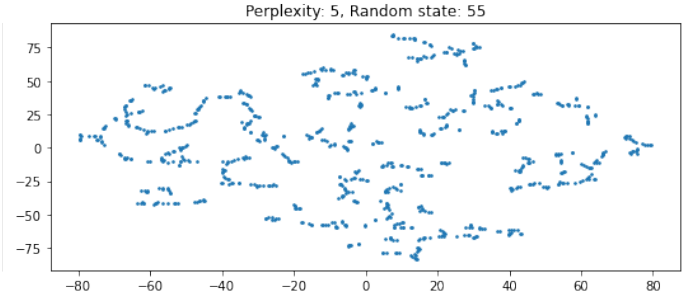
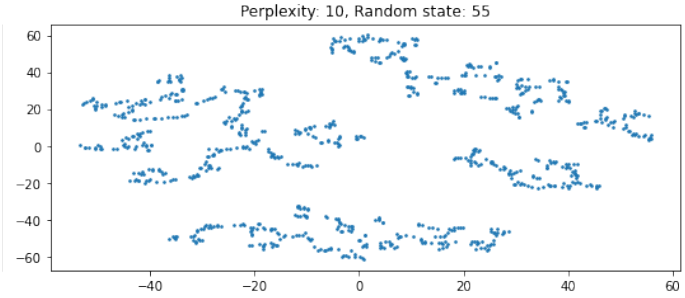
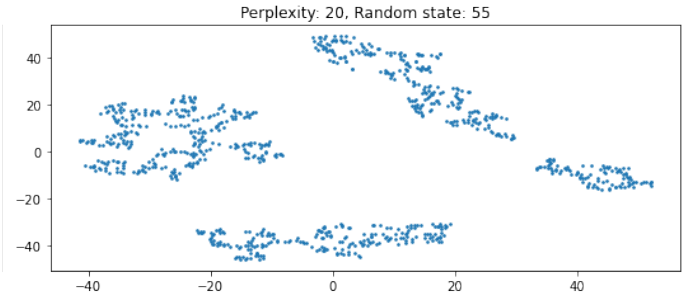

Perplexity: 50, Random state: 44

Set I


Perplexity: 5, Random state: 55


Perplexity: 10, Random state: 55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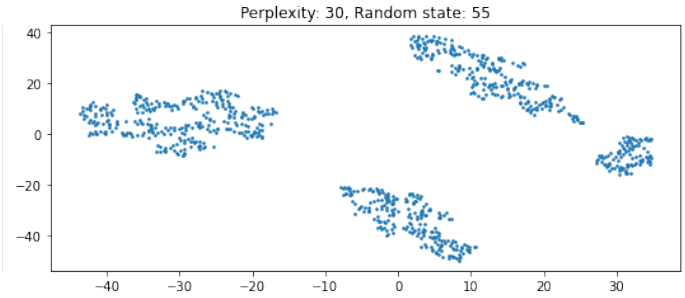
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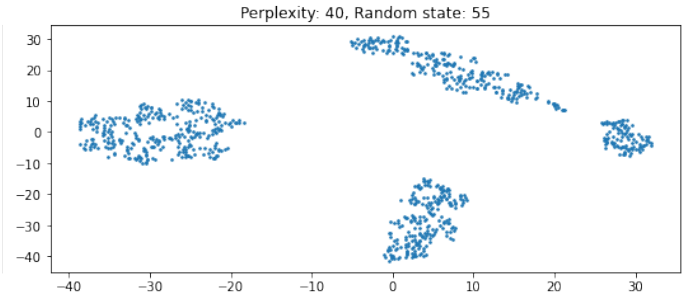
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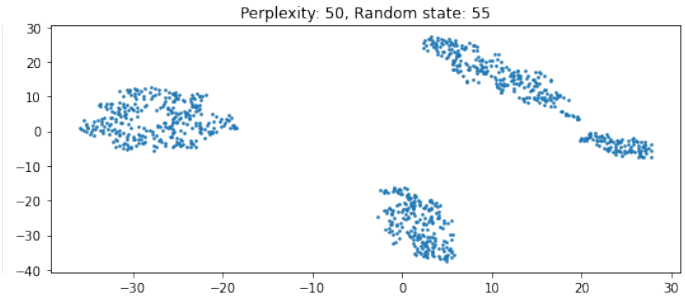
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Set J