Mean shift:

[Hands-On Tutorial on Mean Shift Clustering Algorithm](https://analyticsindiamag.com/ai-trends/hands-on-tutorial-on-mean-shift-clustering-algorithm/)

[Mean Shift Clustering: A Comprehensive Guide | DataCamp](https://www.datacamp.com/tutorial/mean-shift-clustering)

**Spectral clustering:**

[Spectral Clustering in Machine Learning - GeeksforGeeks](https://www.geeksforgeeks.org/machine-learning/ml-spectral-clustering/)

[Spectral Clustering: definition, operation, use](https://datascientest.com/en/spectral-clustering-definition-operation-use)

[Implementing Spectral Clustering from Scratch: A Step-by-Step Guide | by Rahul Jain | Medium](https://rahuljain788.medium.com/implementing-spectral-clustering-from-scratch-a-step-by-step-guide-9643e4836a76)

[Spectral Clustering in Machine Learning - GeeksforGeeks](https://www.geeksforgeeks.org/machine-learning/ml-spectral-clustering/)

[5. Spectral Clustering](https://velog.io/@tobigs-gnn1213/5.-Spectral-Clustering)

[Spectral Clustering Definition | DeepAI](https://deepai.org/machine-learning-glossary-and-terms/spectral-clustering)

[DBSCAN Clustering in ML - Density based clustering - GeeksforGeeks](https://www.geeksforgeeks.org/machine-learning/dbscan-clustering-in-ml-density-based-clustering/)

[A Guide to the DBSCAN Clustering Algorithm | DataCamp](https://www.datacamp.com/tutorial/dbscan-clustering-algorithm)

**Pros of DBSCAN**

1. **Arbitrary Shape Clusters**: DBSCAN can discover clusters of arbitrary shape, unlike k-means which assumes spherical clusters[1](https://www.bing.com/ck/a?!&&p=abb059c5d10ccdca4bccc84b50c59620df5e02124f595900d5d464ccd68d2fd8JmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&psq=pros+and+cons+of+dbscan&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1)[2](https://www.bing.com/ck/a?!&&p=665f7ad6c963e6e15861631ade048c48c582af27093c3cace6c8092ff907ab3aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&psq=pros+and+cons+of+dbscan&u=a1aHR0cHM6Ly90b3dhcmRzZGF0YXNjaWVuY2UuY29tL2Ric2Nhbi1jbHVzdGVyaW5nLWV4cGxhaW5lZC05NzU1NmEyYWQ1NTYv&ntb=1). This makes it suitable for datasets with complex cluster shapes.
2. **Robust to Noise**: DBSCAN is robust to noise and can identify points that do not belong to any cluster as outliers[1](https://www.bing.com/ck/a?!&&p=abb059c5d10ccdca4bccc84b50c59620df5e02124f595900d5d464ccd68d2fd8JmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&psq=pros+and+cons+of+dbscan&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1)[2](https://www.bing.com/ck/a?!&&p=665f7ad6c963e6e15861631ade048c48c582af27093c3cace6c8092ff907ab3aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&psq=pros+and+cons+of+dbscan&u=a1aHR0cHM6Ly90b3dhcmRzZGF0YXNjaWVuY2UuY29tL2Ric2Nhbi1jbHVzdGVyaW5nLWV4cGxhaW5lZC05NzU1NmEyYWQ1NTYv&ntb=1). This is particularly useful in applications like anomaly detection.
3. **No Need to Specify Number of Clusters**: Unlike k-means, DBSCAN does not require the number of clusters to be specified in advance[1](https://www.bing.com/ck/a?!&&p=abb059c5d10ccdca4bccc84b50c59620df5e02124f595900d5d464ccd68d2fd8JmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&psq=pros+and+cons+of+dbscan&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1)[2](https://www.bing.com/ck/a?!&&p=665f7ad6c963e6e15861631ade048c48c582af27093c3cace6c8092ff907ab3aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&psq=pros+and+cons+of+dbscan&u=a1aHR0cHM6Ly90b3dhcmRzZGF0YXNjaWVuY2UuY29tL2Ric2Nhbi1jbHVzdGVyaW5nLWV4cGxhaW5lZC05NzU1NmEyYWQ1NTYv&ntb=1). This makes it more flexible and easier to use when the number of clusters is unknown.

**Cons of DBSCAN**

1. **Parameter Sensitivity**: DBSCAN is sensitive to the choice of its parameters, Eps (distance threshold) and MinPts (minimum number of points)[1](https://www.bing.com/ck/a?!&&p=fa06322fd41eeb5dce3e0844ec6b9b3b9cbc6510e2b2651f055ad4de7e11d63aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1)[2](https://www.bing.com/ck/a?!&&p=6fd278459889155608a32e77af7f9f0a9e17265d9a7e1a2b625c1768ad802372JmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&u=a1aHR0cHM6Ly90b3dhcmRzZGF0YXNjaWVuY2UuY29tL2Ric2Nhbi1jbHVzdGVyaW5nLWV4cGxhaW5lZC05NzU1NmEyYWQ1NTYv&ntb=1). Choosing appropriate values for these parameters can be challenging and often requires domain knowledge.
2. **Varying Densities**: DBSCAN does not work well with clusters of varying densities[1](https://www.bing.com/ck/a?!&&p=fa06322fd41eeb5dce3e0844ec6b9b3b9cbc6510e2b2651f055ad4de7e11d63aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1)[2](https://www.bing.com/ck/a?!&&p=6fd278459889155608a32e77af7f9f0a9e17265d9a7e1a2b625c1768ad802372JmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&u=a1aHR0cHM6Ly90b3dhcmRzZGF0YXNjaWVuY2UuY29tL2Ric2Nhbi1jbHVzdGVyaW5nLWV4cGxhaW5lZC05NzU1NmEyYWQ1NTYv&ntb=1). The algorithm may fail to identify clusters correctly if the density of points varies significantly across the dataset.
3. **Computational Cost**: DBSCAN has a high computational cost when the number of data points is large[1](https://www.bing.com/ck/a?!&&p=fa06322fd41eeb5dce3e0844ec6b9b3b9cbc6510e2b2651f055ad4de7e11d63aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1). This can make it less efficient for very large datasets.
4. **Cluster Detection**: DBSCAN is not guaranteed to find all clusters in the data[1](https://www.bing.com/ck/a?!&&p=fa06322fd41eeb5dce3e0844ec6b9b3b9cbc6510e2b2651f055ad4de7e11d63aJmltdHM9MTc1Mjg4MzIwMA&ptn=3&ver=2&hsh=4&fclid=19c0659a-8e46-60e6-3001-71c18ff46119&u=a1aHR0cHM6Ly9wbGFpbmVuZ2xpc2guaW8vYmxvZy9ob3ctZG9lcy10aGUtZGJzY2FuLWFsZ29yaXRobS13b3JrLXByb3MtYW5kLWNvbnMtb2YtZGJzY2Fu&ntb=1). Some clusters may be missed if the parameters are not chosen correctly.

[A Guide to the DBSCAN Clustering Algorithm | DataCamp](https://www.datacamp.com/tutorial/dbscan-clustering-algorithm)

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[HDBSCAN: The Supercharged Version of DBSCAN — An Algorithmic Deep Dive](https://www.dailydoseofds.com/hdbscan-the-supercharged-version-of-dbscan-an-algorithmic-deep-dive/)

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[BIRCH algorithm.ppt](https://view.officeapps.live.com/op/view.aspx?src=http%3A%2F%2Fhome.etf.rs%2F~vm%2Fos%2Fdmsw%2FBIRCH%2520algorithm.ppt&wdOrigin=BROWSELINK)