



Reconocimiento de Patrones

Version 2022-2

Clustering: Mean Shift

[Capítulo 6]

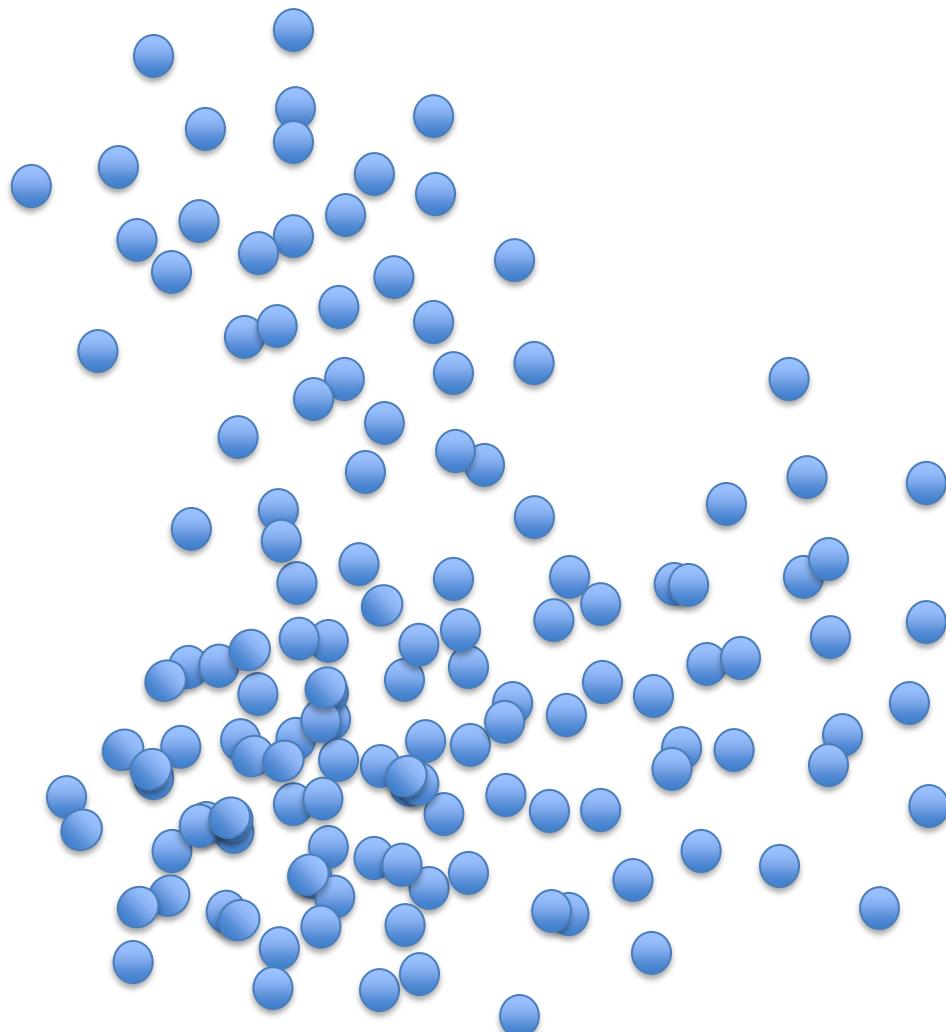
Dr. José Ramón Iglesias

DSP-ASIC BUILDER GROUP

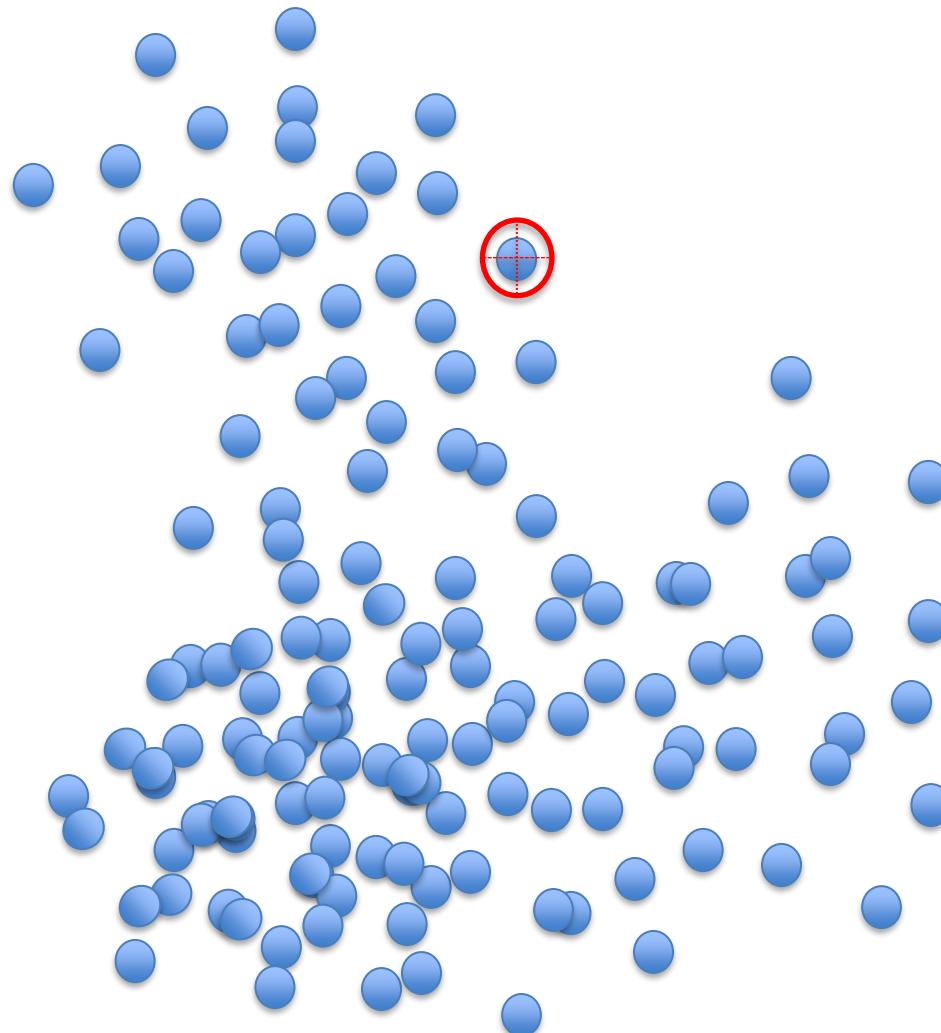
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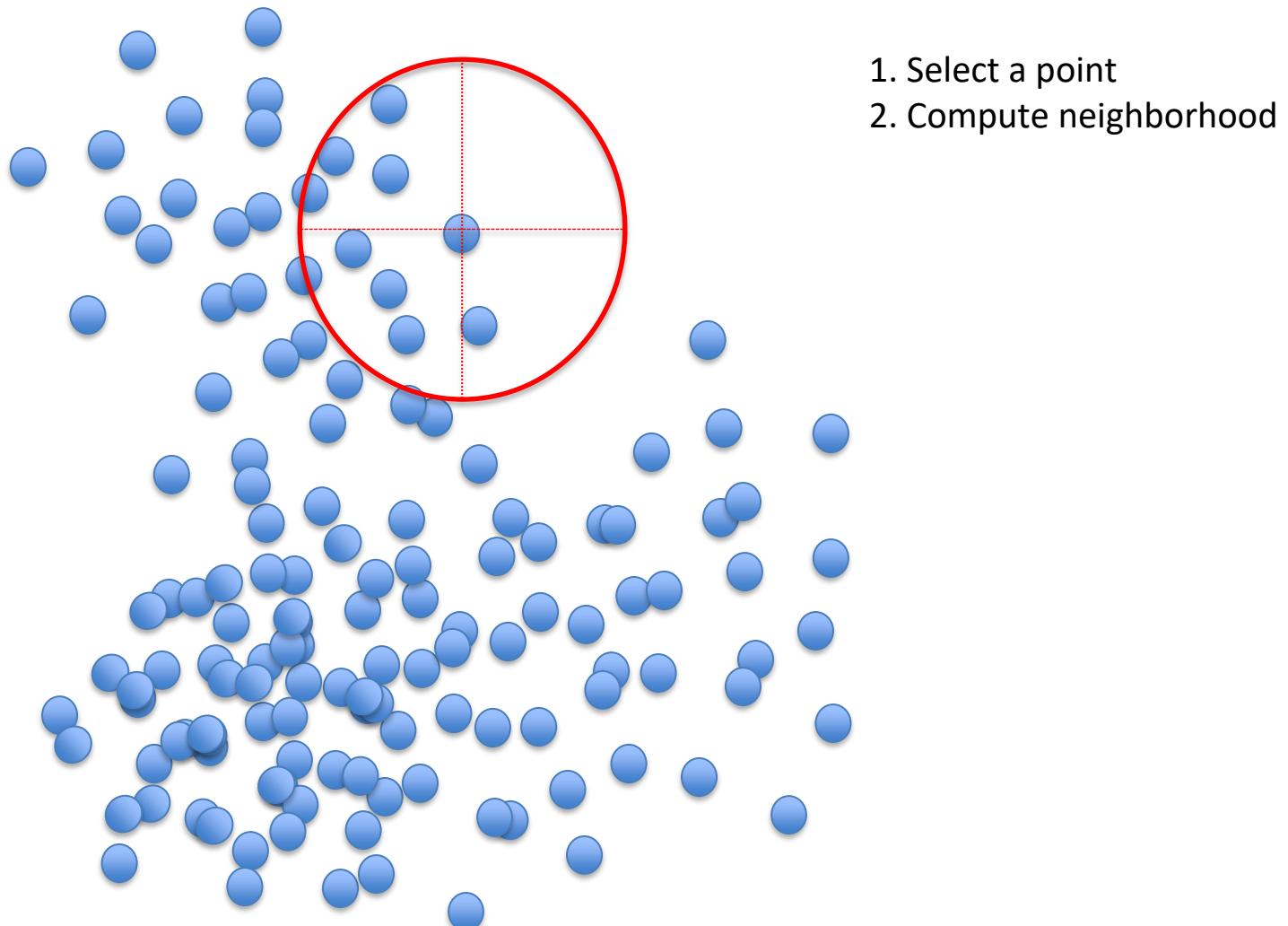
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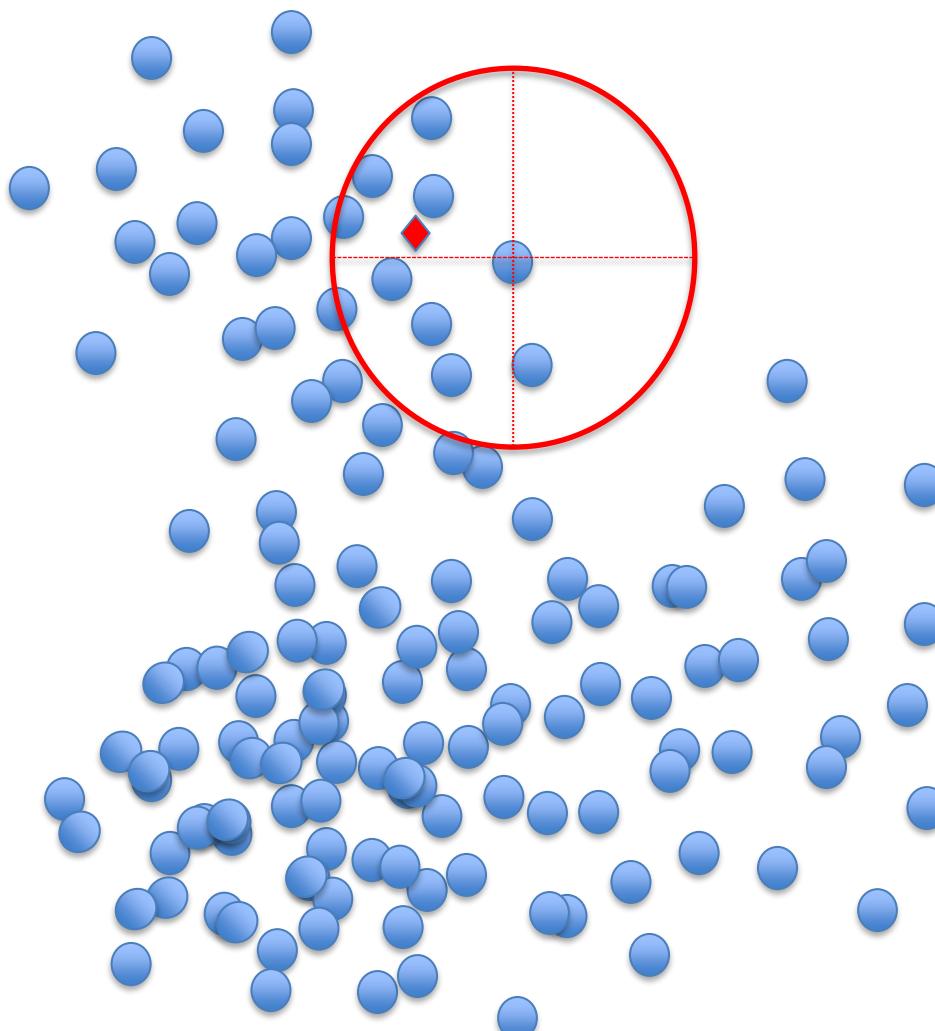
Universidad Popular del Cesar



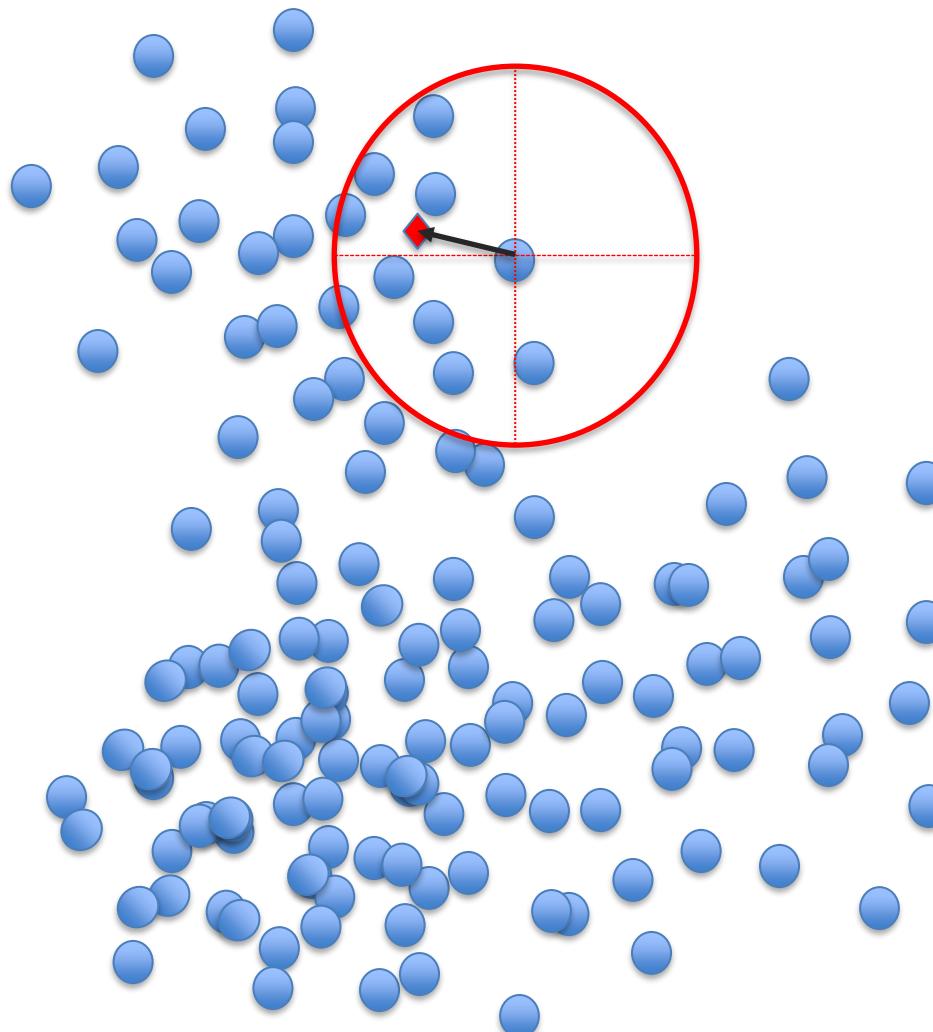
1. Select a point



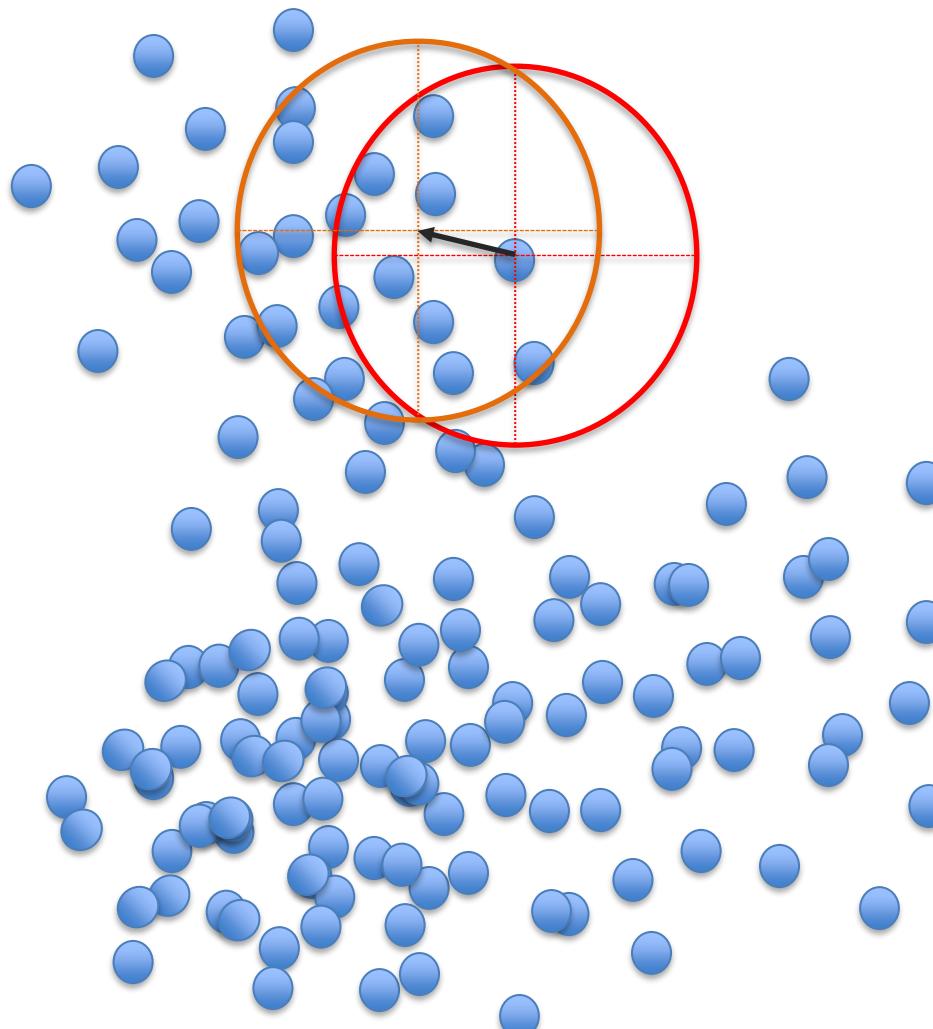




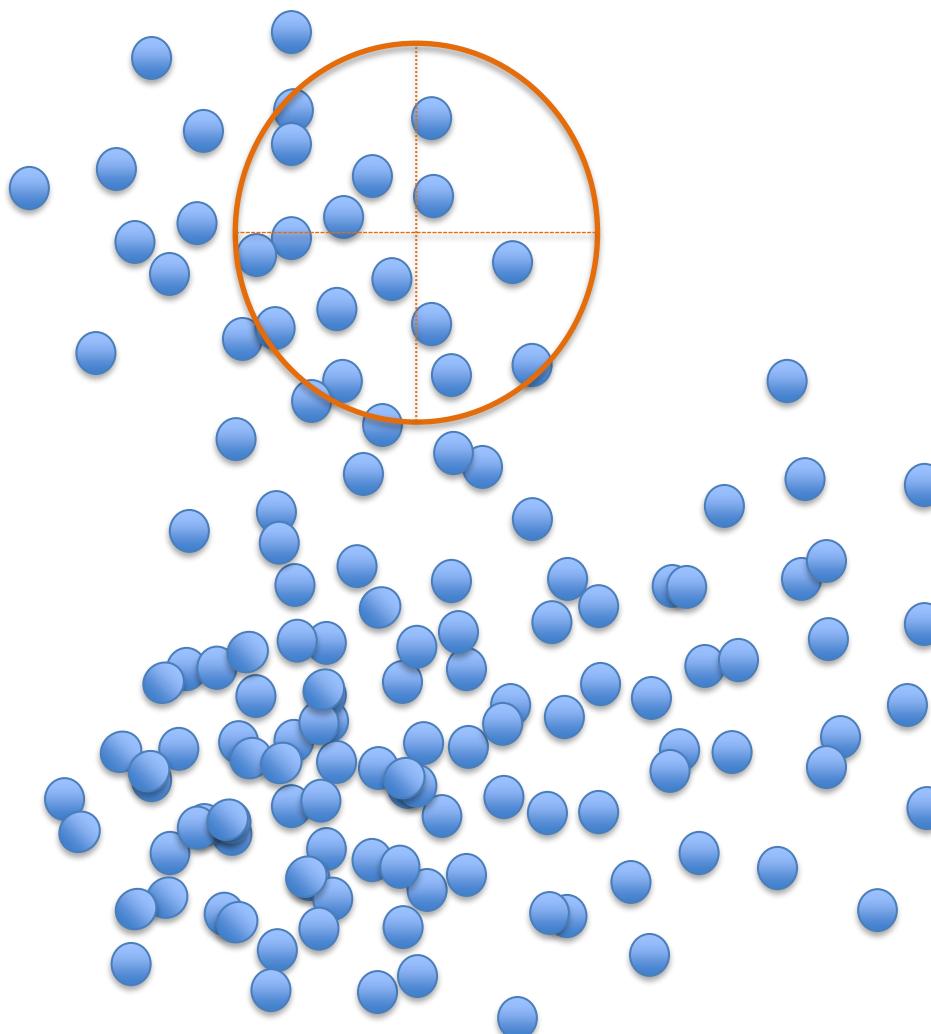
1. Select a point
2. Compute neighborhood
3. Compute centroid



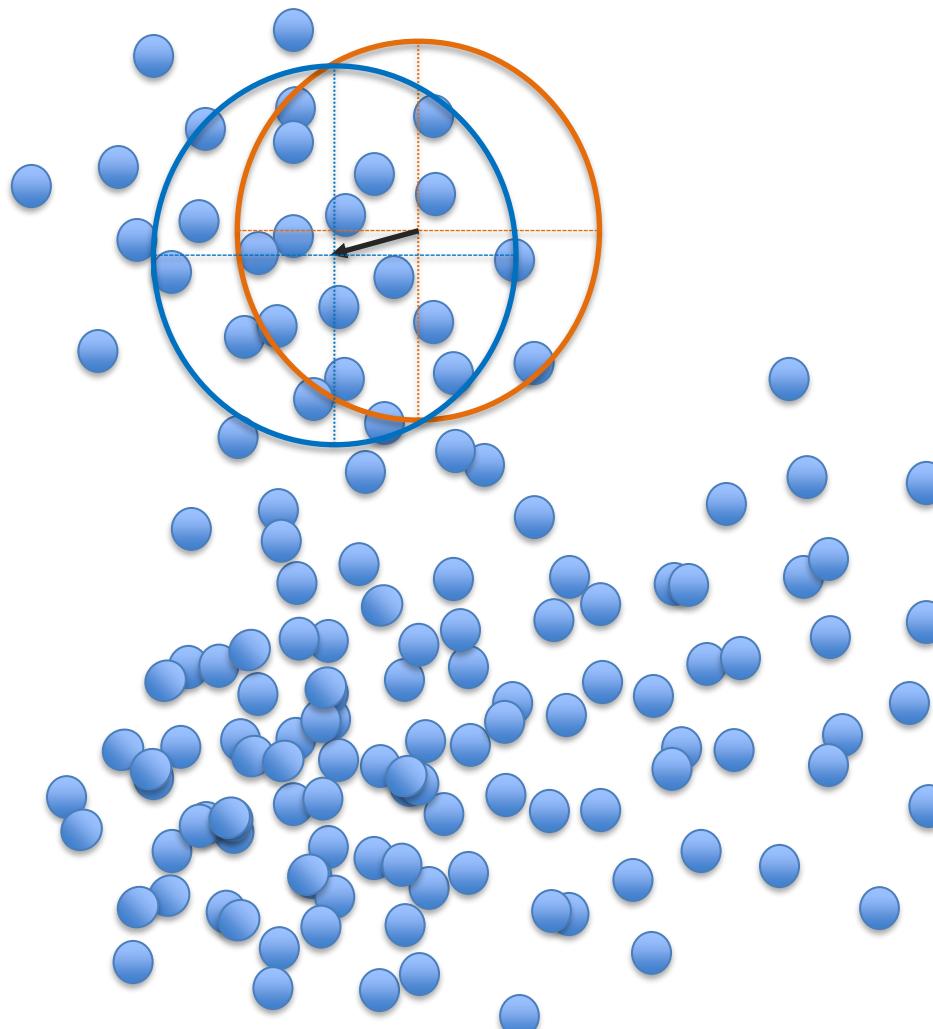
1. Select a point
2. Compute neighborhood
3. Compute centroid
4. Compute mean shift



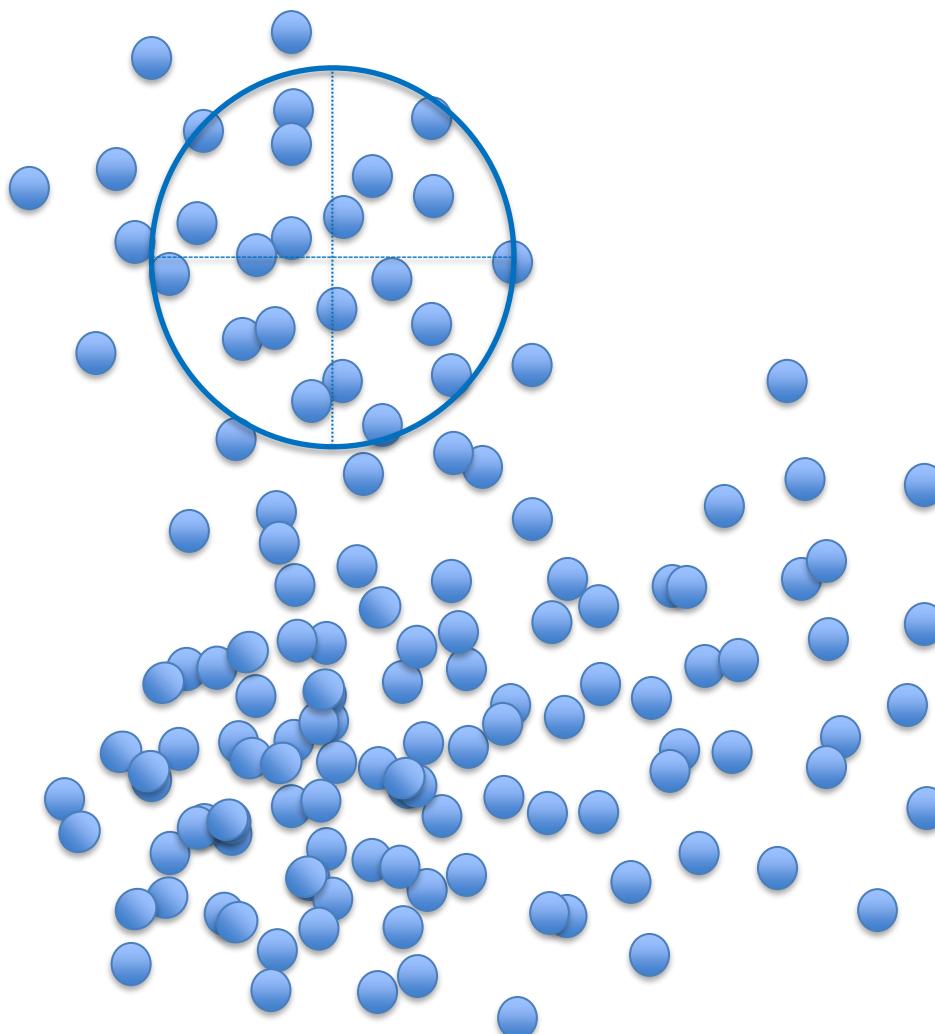
1. Select a point
2. Compute neighborhood
3. Compute centroid
4. Compute mean shift
5. Update neighborhood



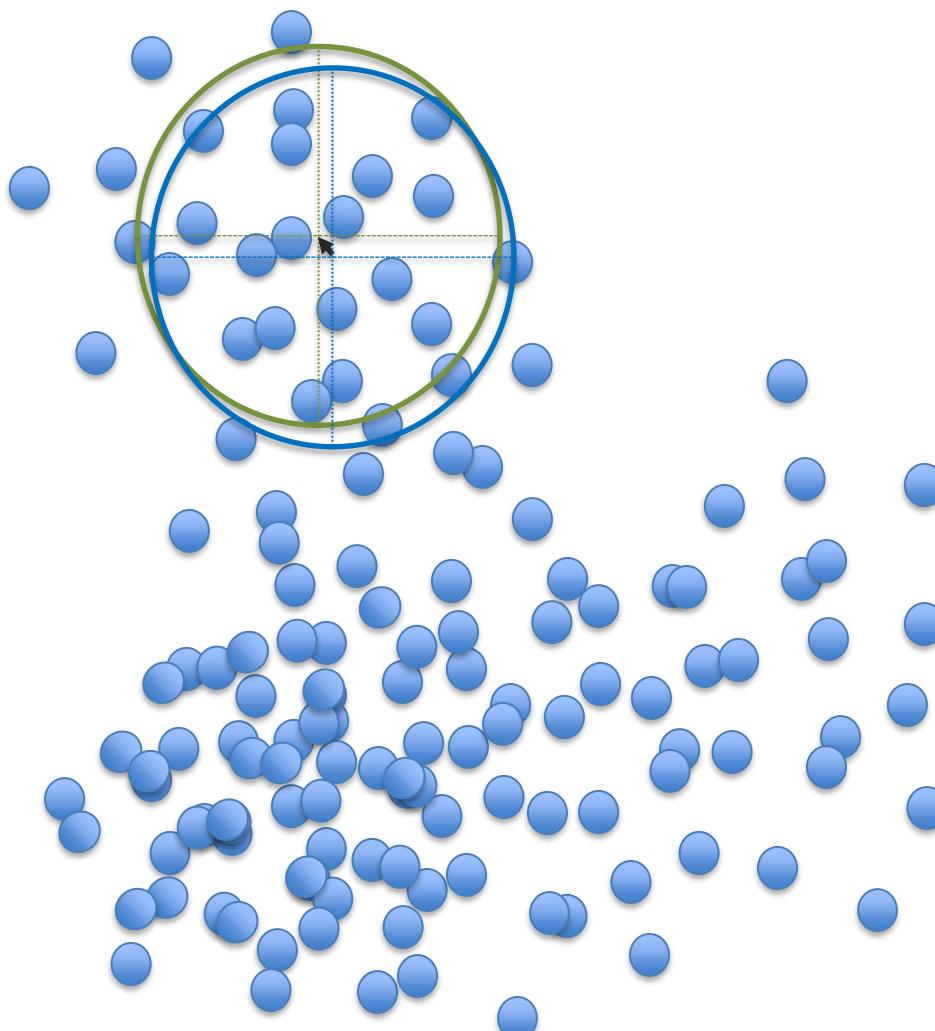
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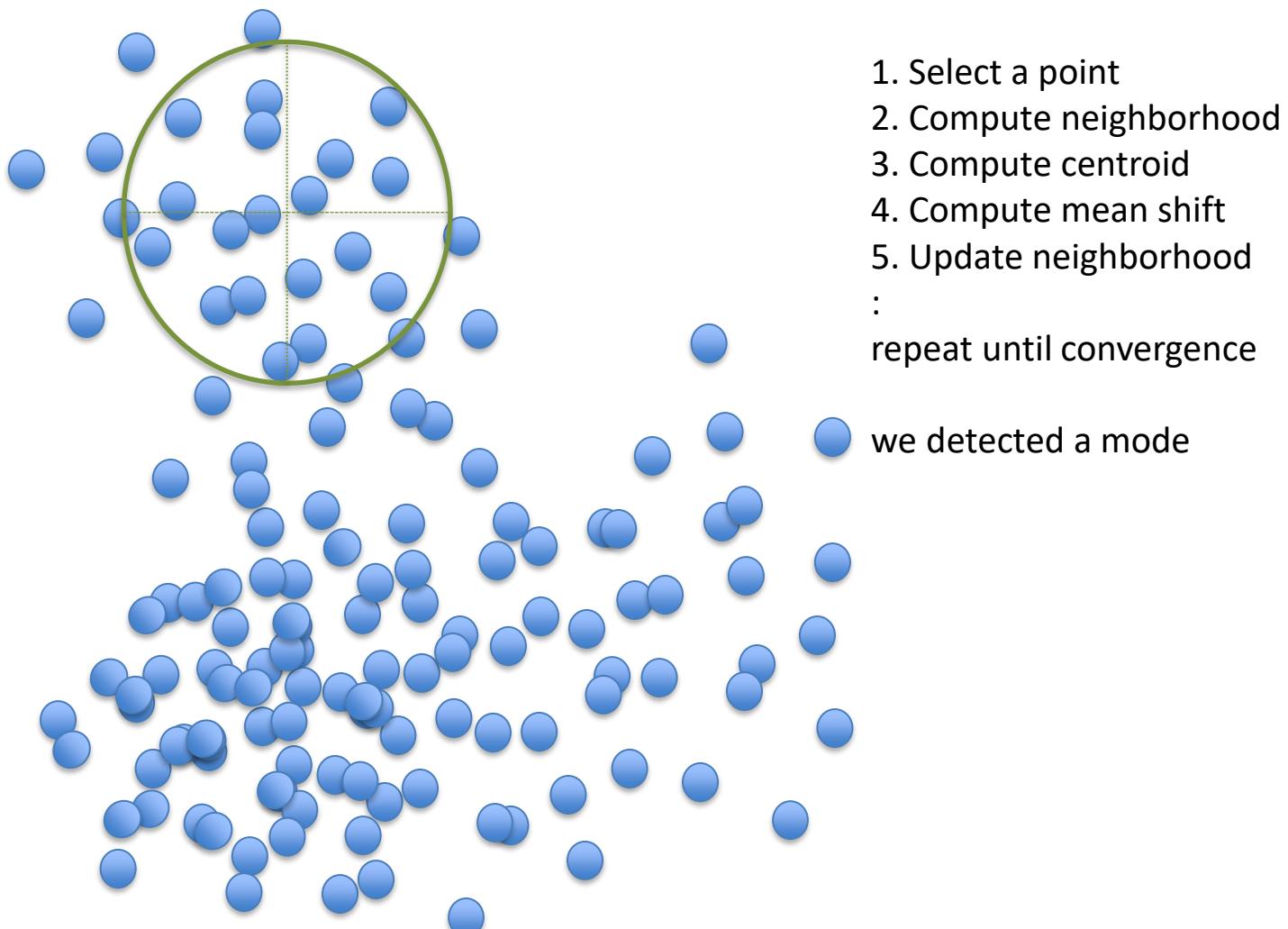
1. Select a point
2. Compute neighborhood
3. Compute centroid
4. Compute mean shift
5. Update neighborhood
- :
repeat until convergence

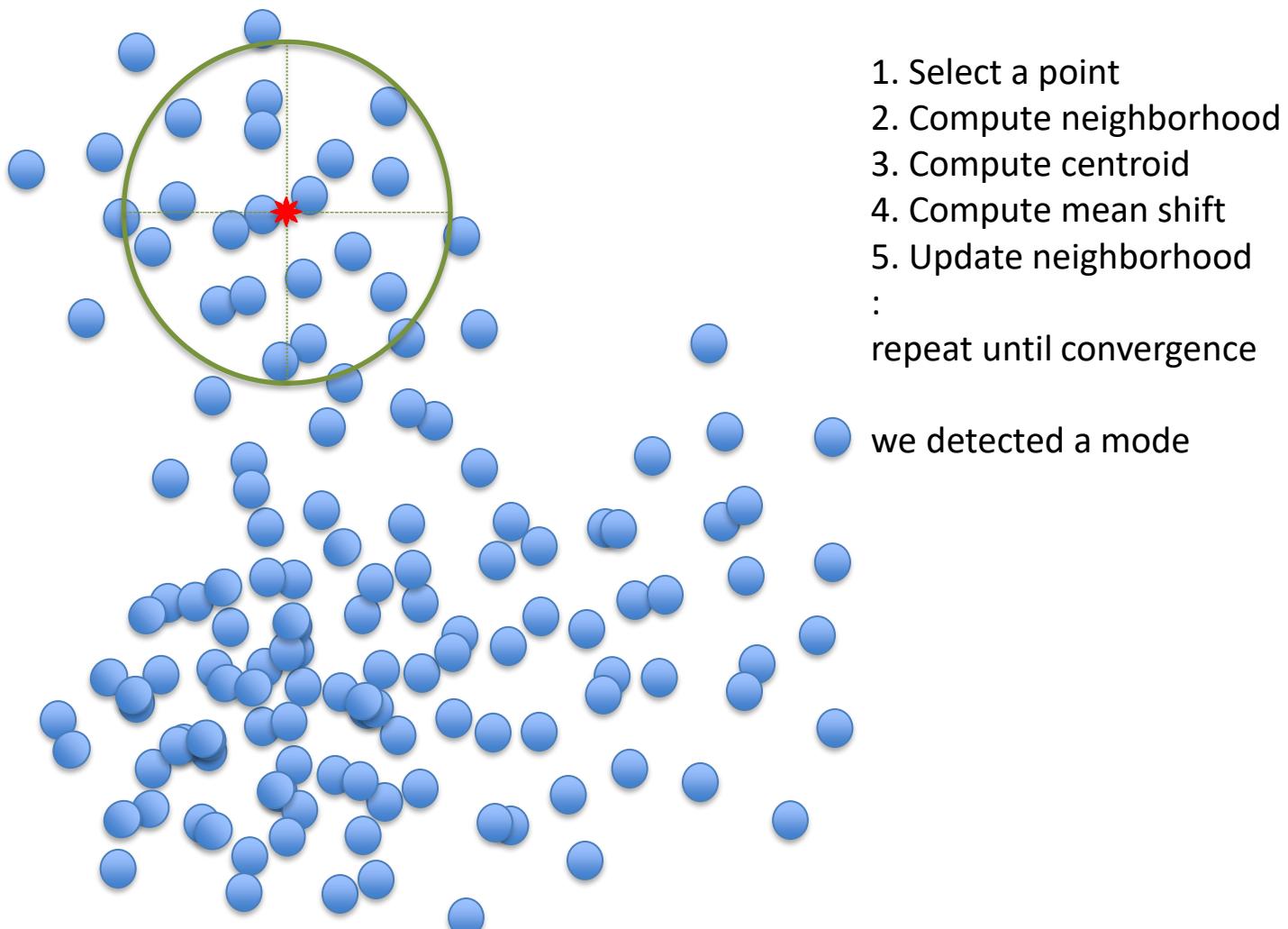


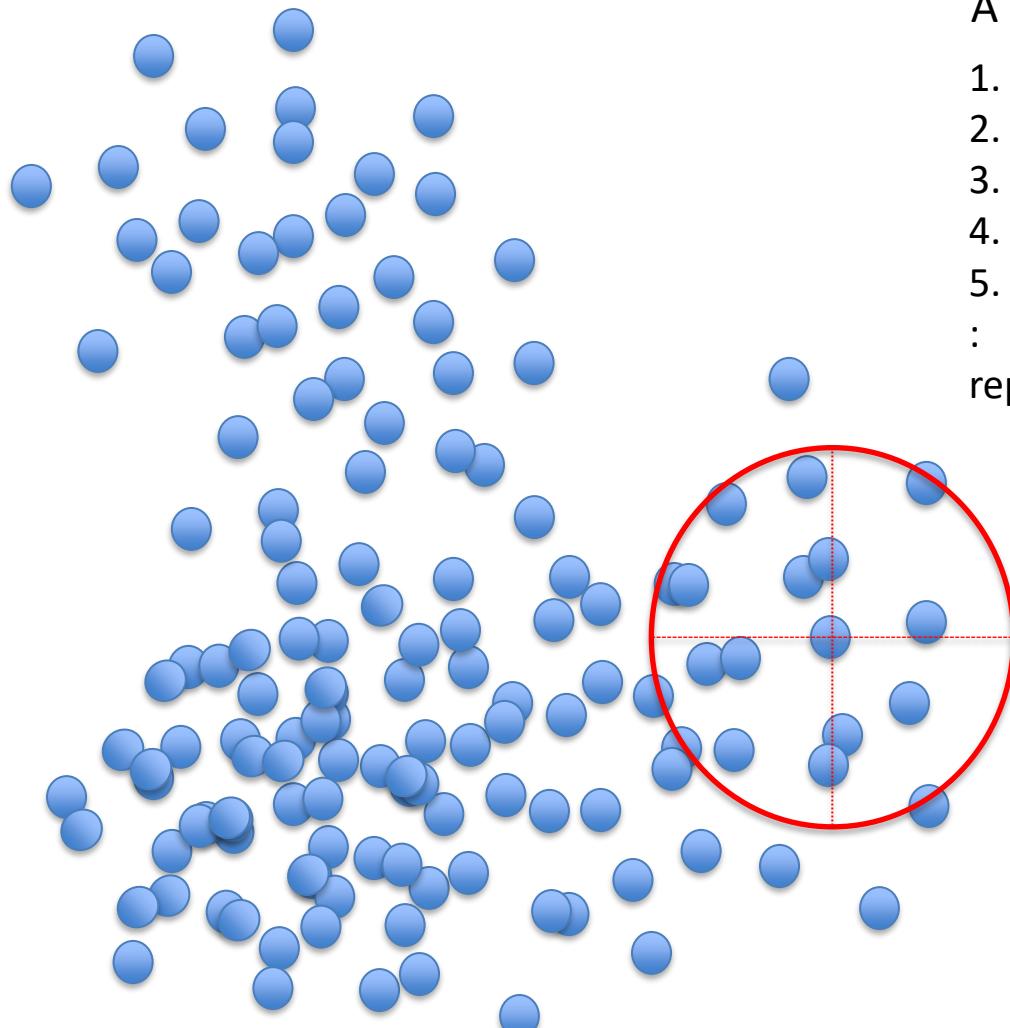
1. Select a point
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repeat until convergence



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3. Compute centroid
4. Compute mean shift
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- repeat until convergence

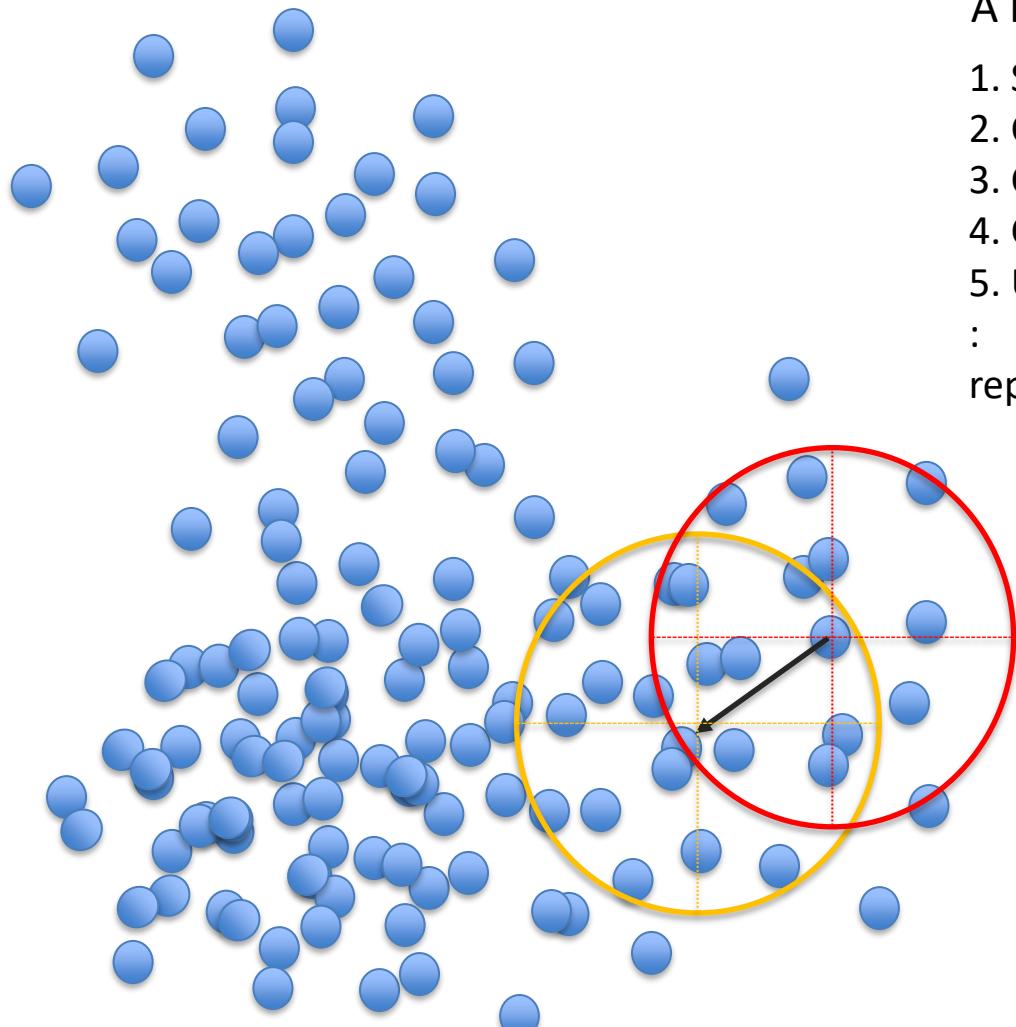






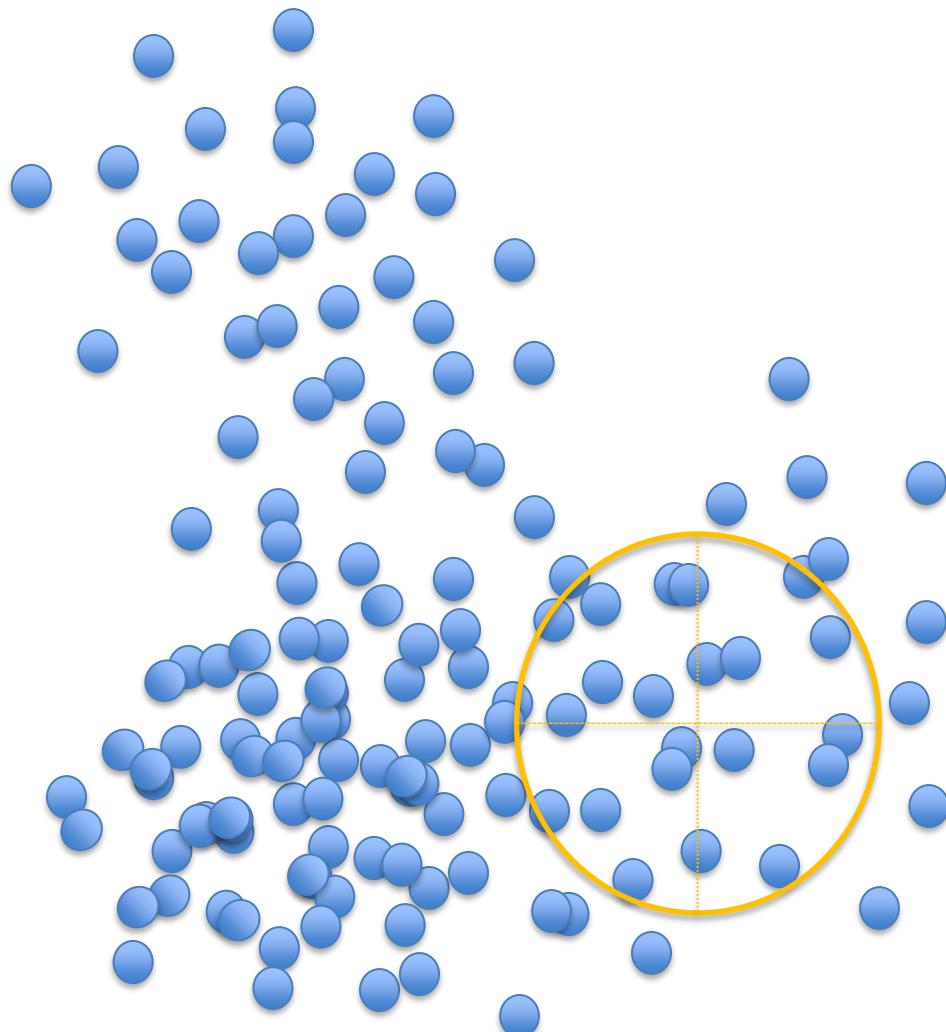
A new example:

1. Select a point
2. Compute neighborhood
3. Compute centroid
4. Compute mean shift
5. Update neighborhood
- :
- repeat until convergence



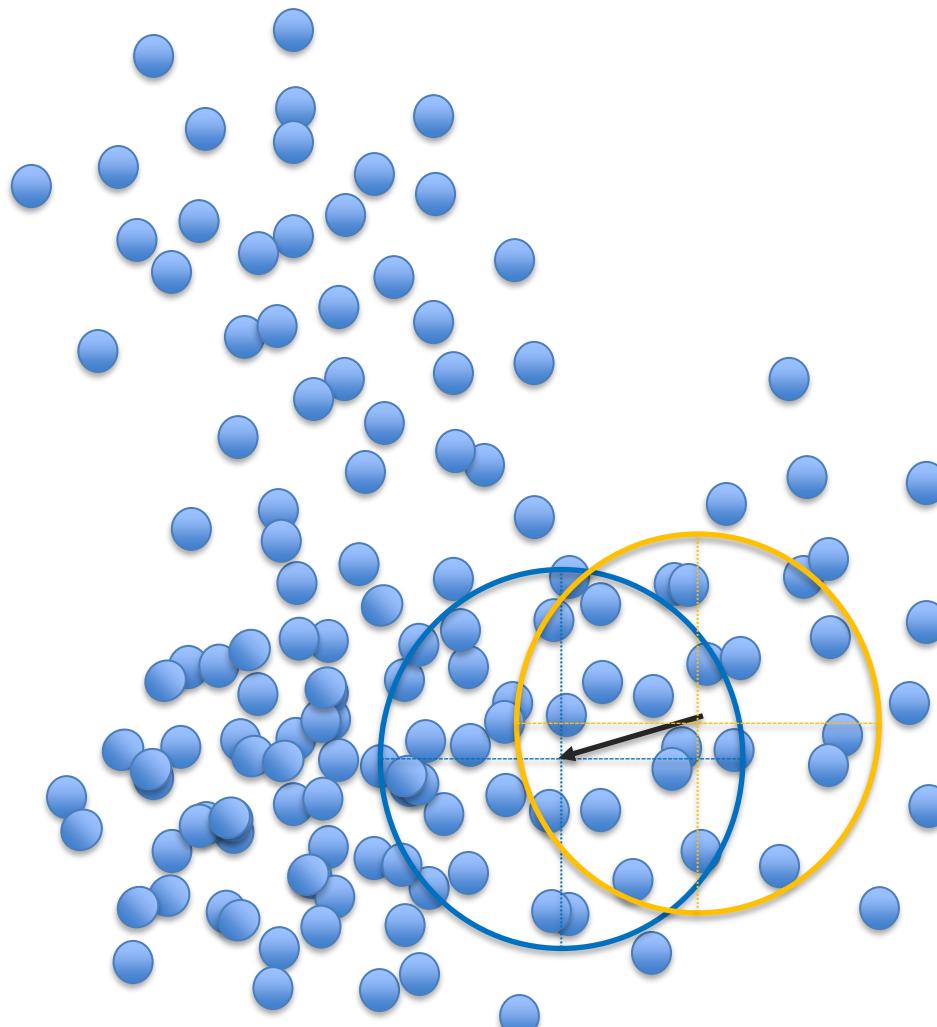
A new example:

1. Select a point
2. Compute neighborhood
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- repeat until convergence



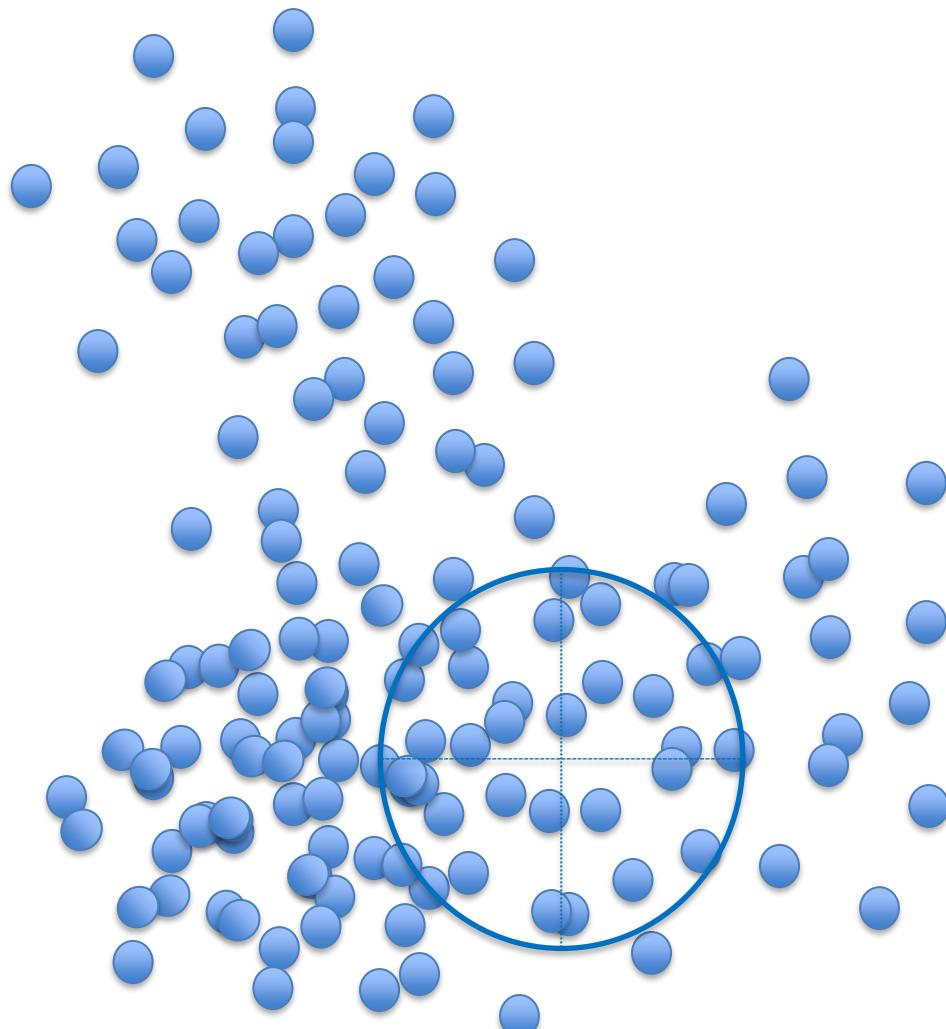
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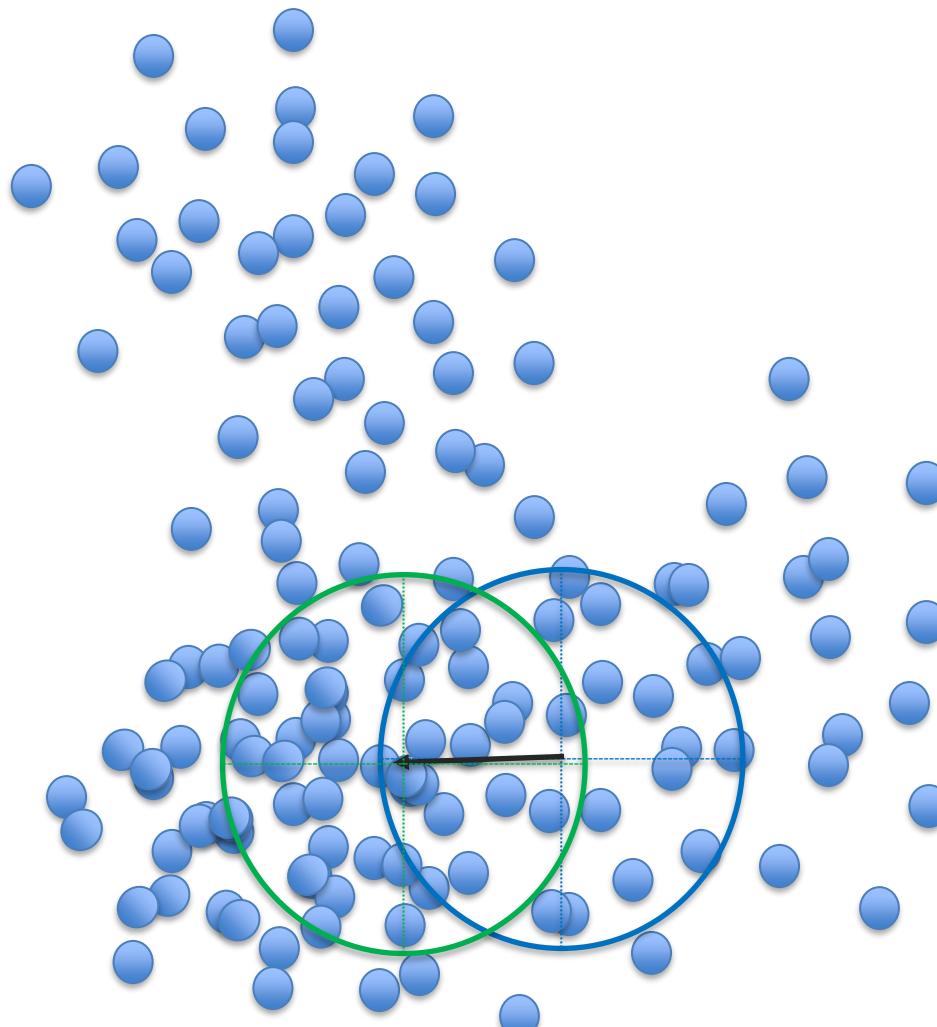
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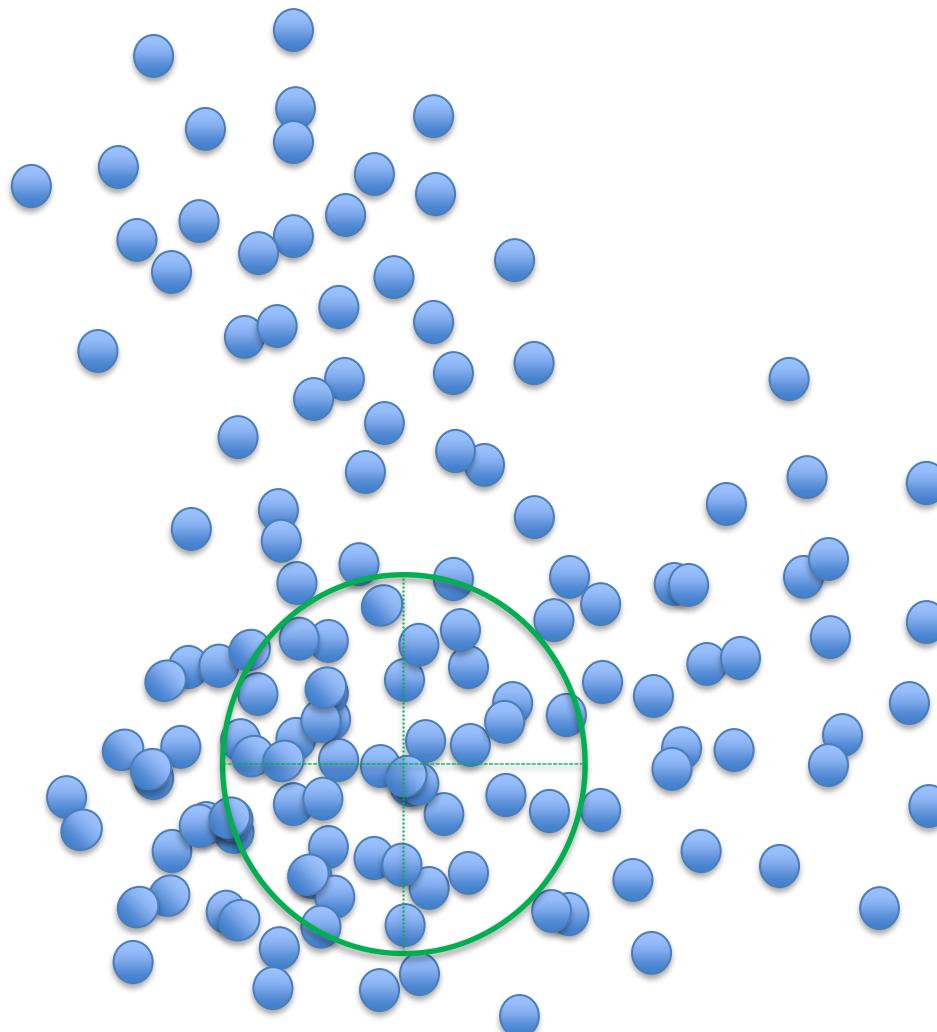
A new example:

1. Select a point
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4. Compute mean shift
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- repeat until convergence



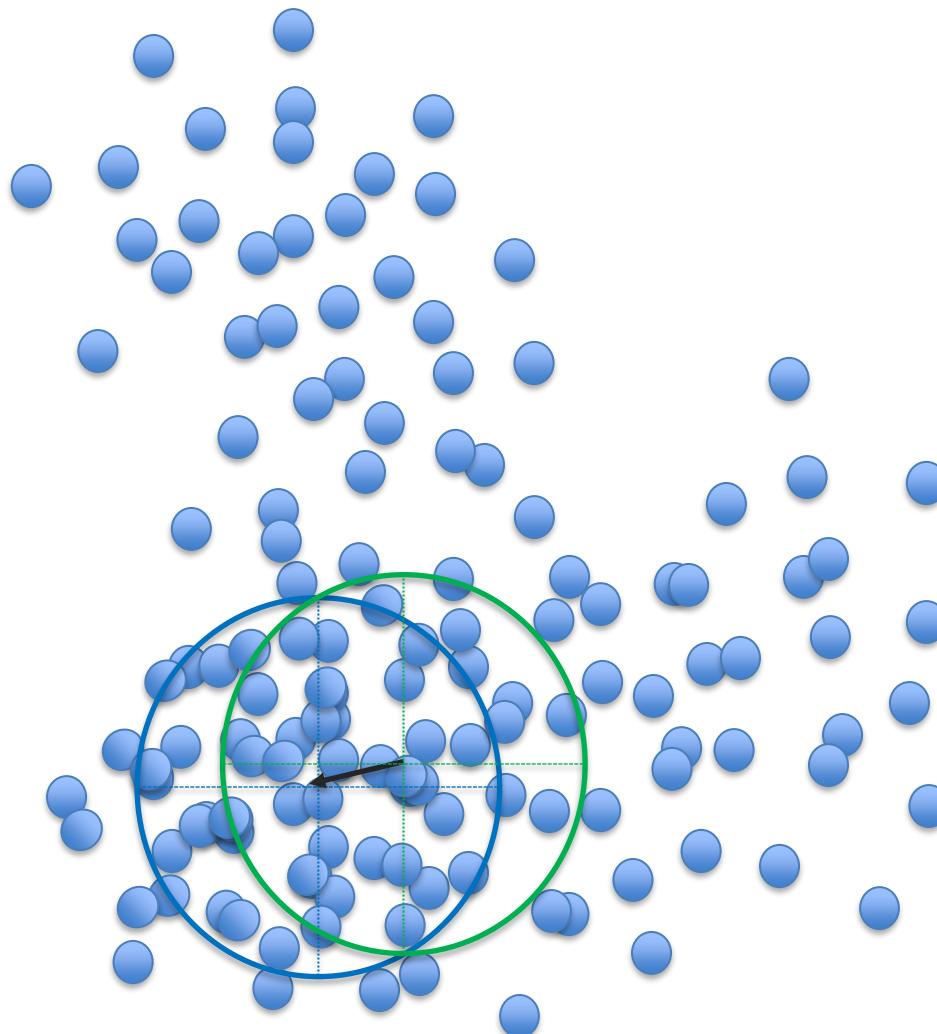
A new example:

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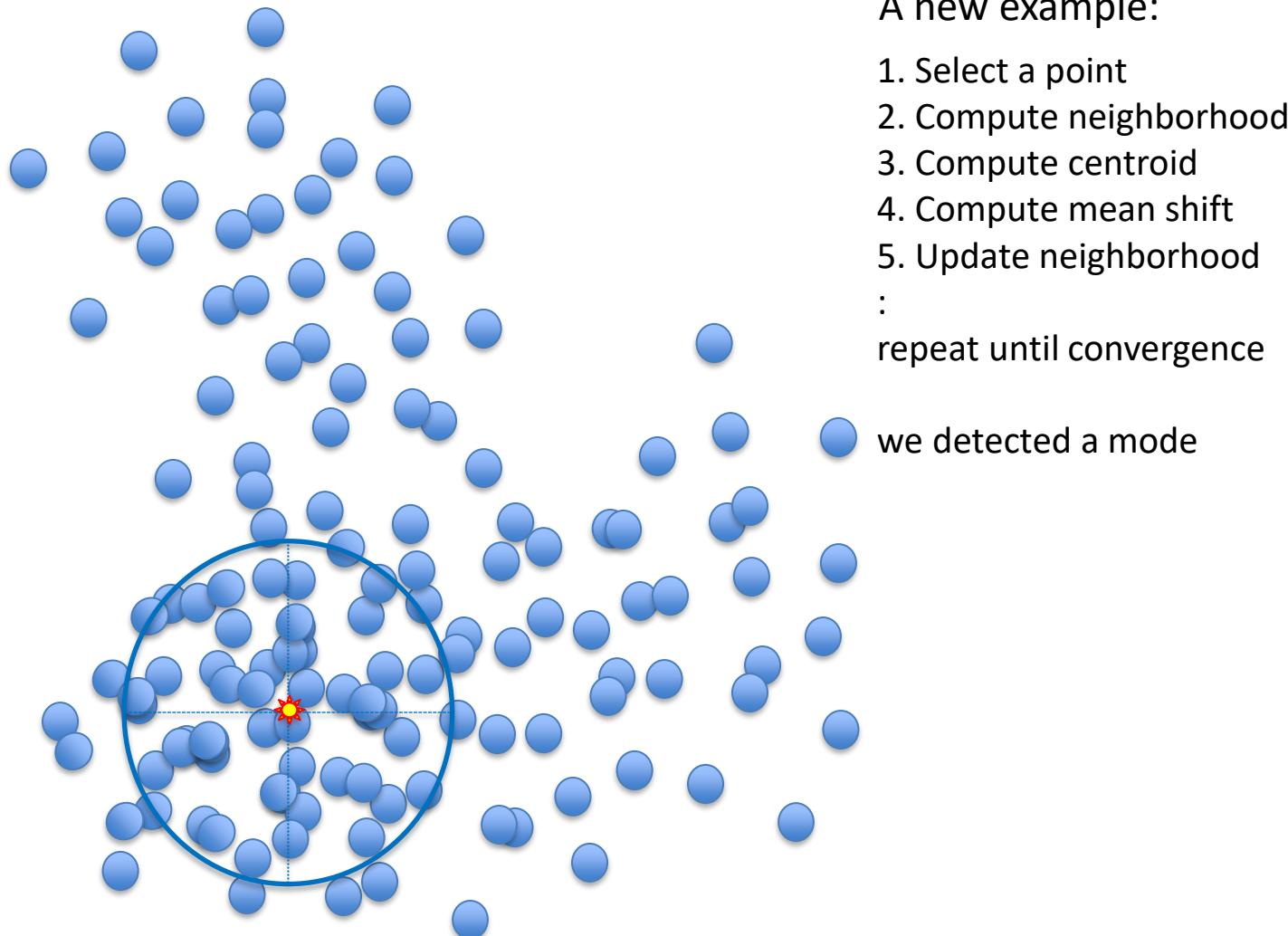
A new example:

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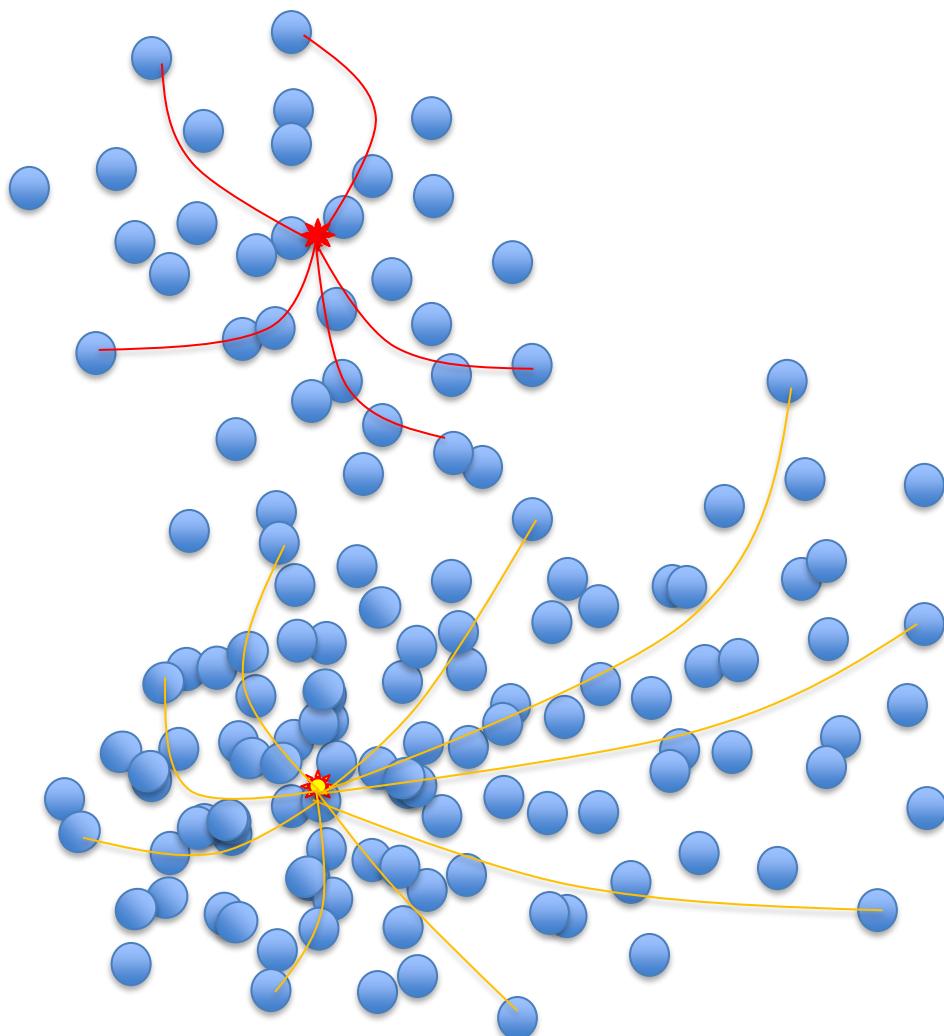
A new example:

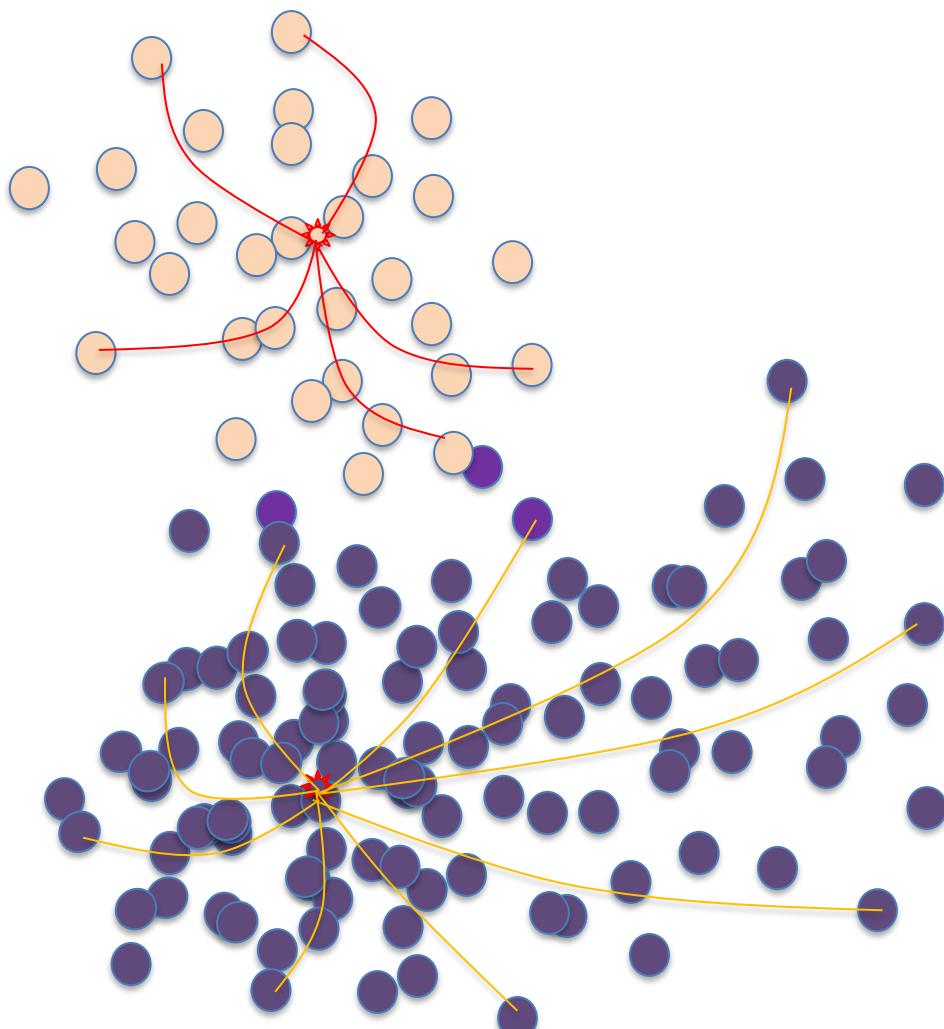
1. Select a point
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4. Compute mean shift
5. Update neighborhood
- :
- repeat until convergence

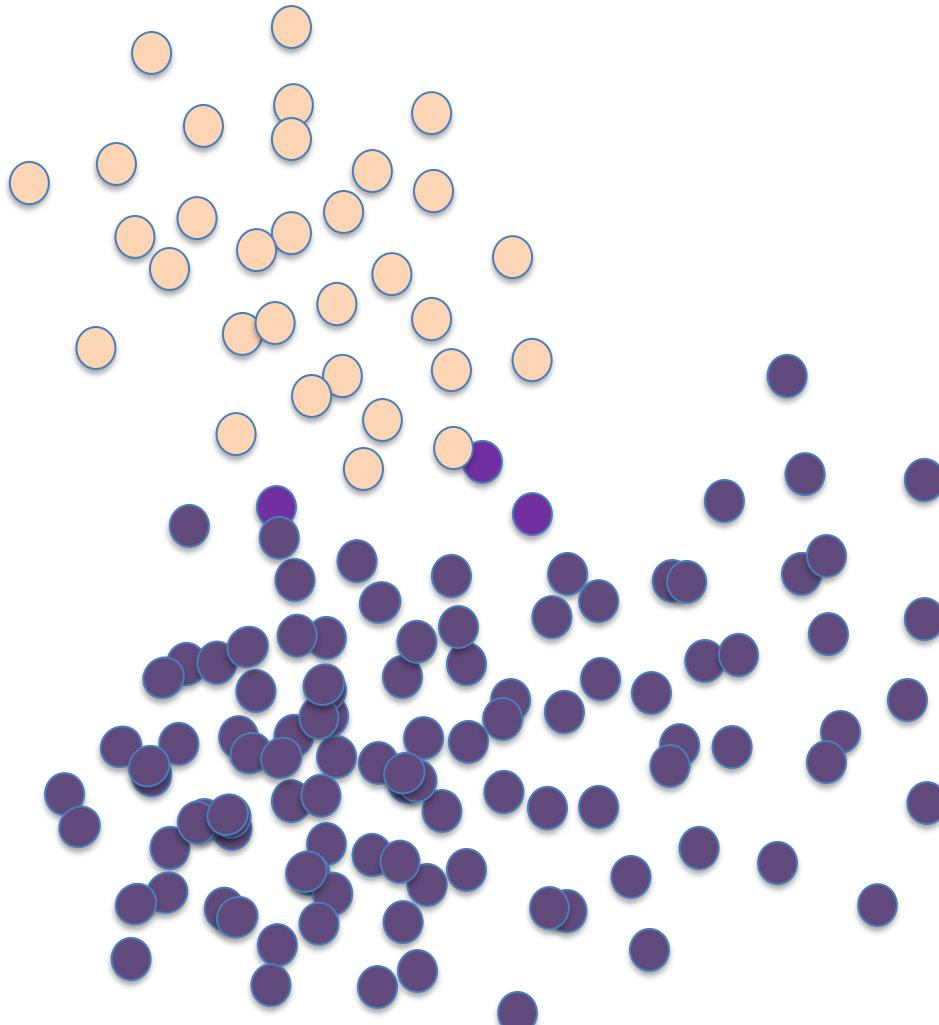


Mean Shift Algorithm

- For each sample point compute its mean shift mode
- Cluster the sample points that have the same mean shift mode







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- Cluster the sample points that have the same mean shift mode

Variation

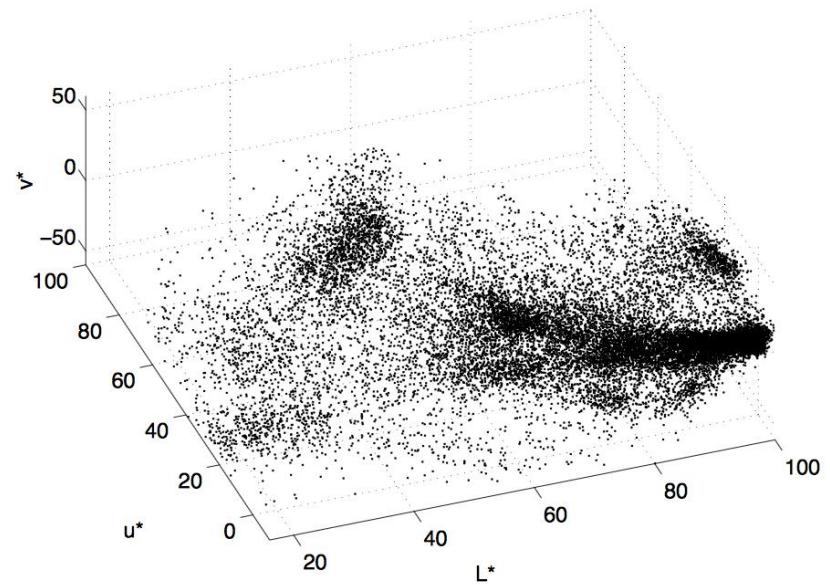
- When compute the centroid weight the distances according a kernel function (eg. Gaussian)

Example

Comaniciu, D., & Meer, P. (2002). Mean shift: A robust approach toward feature space analysis. *IEEE Transactions on pattern analysis and machine intelligence*, 24(5), 603-619. [[PDF](#)]

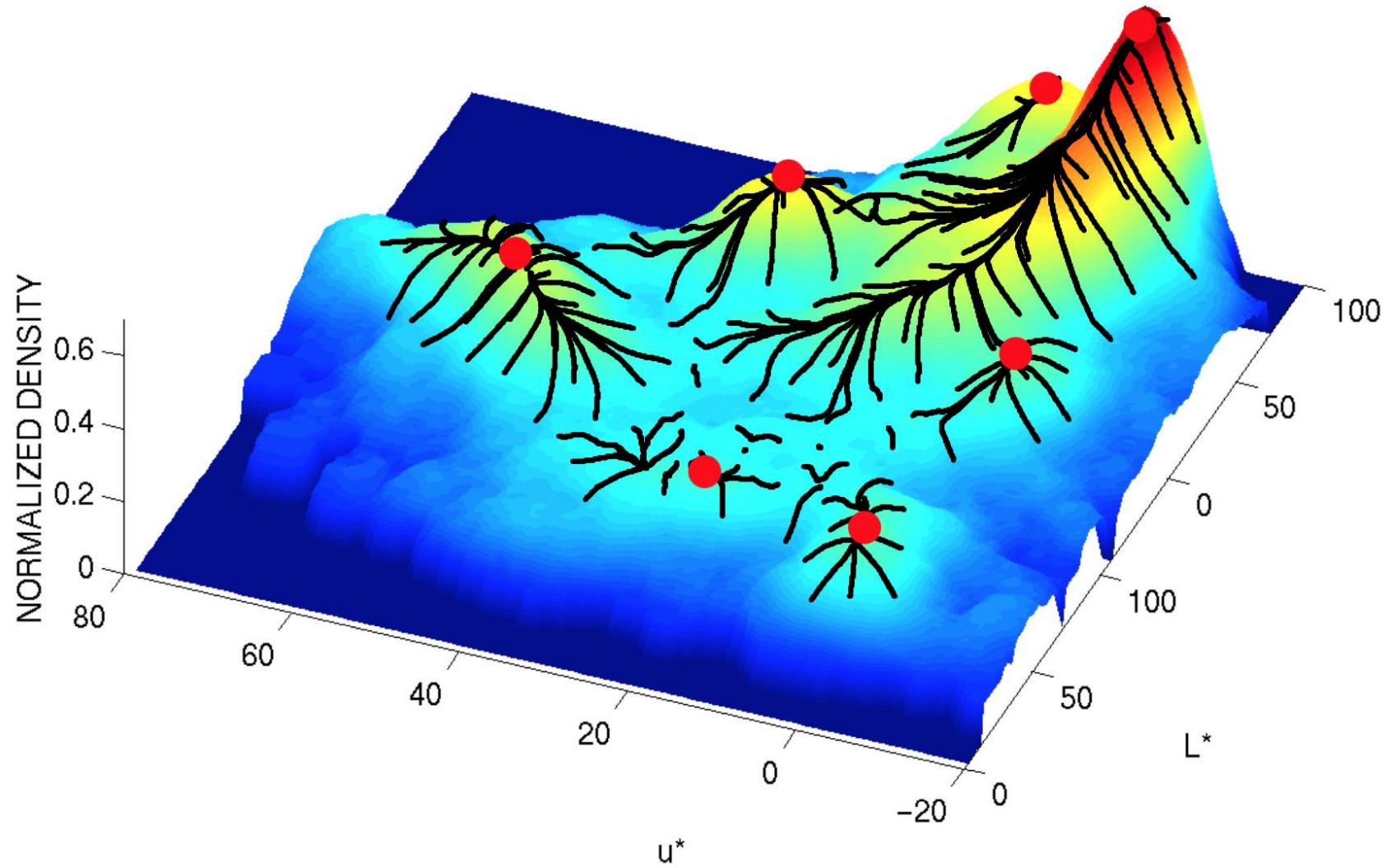


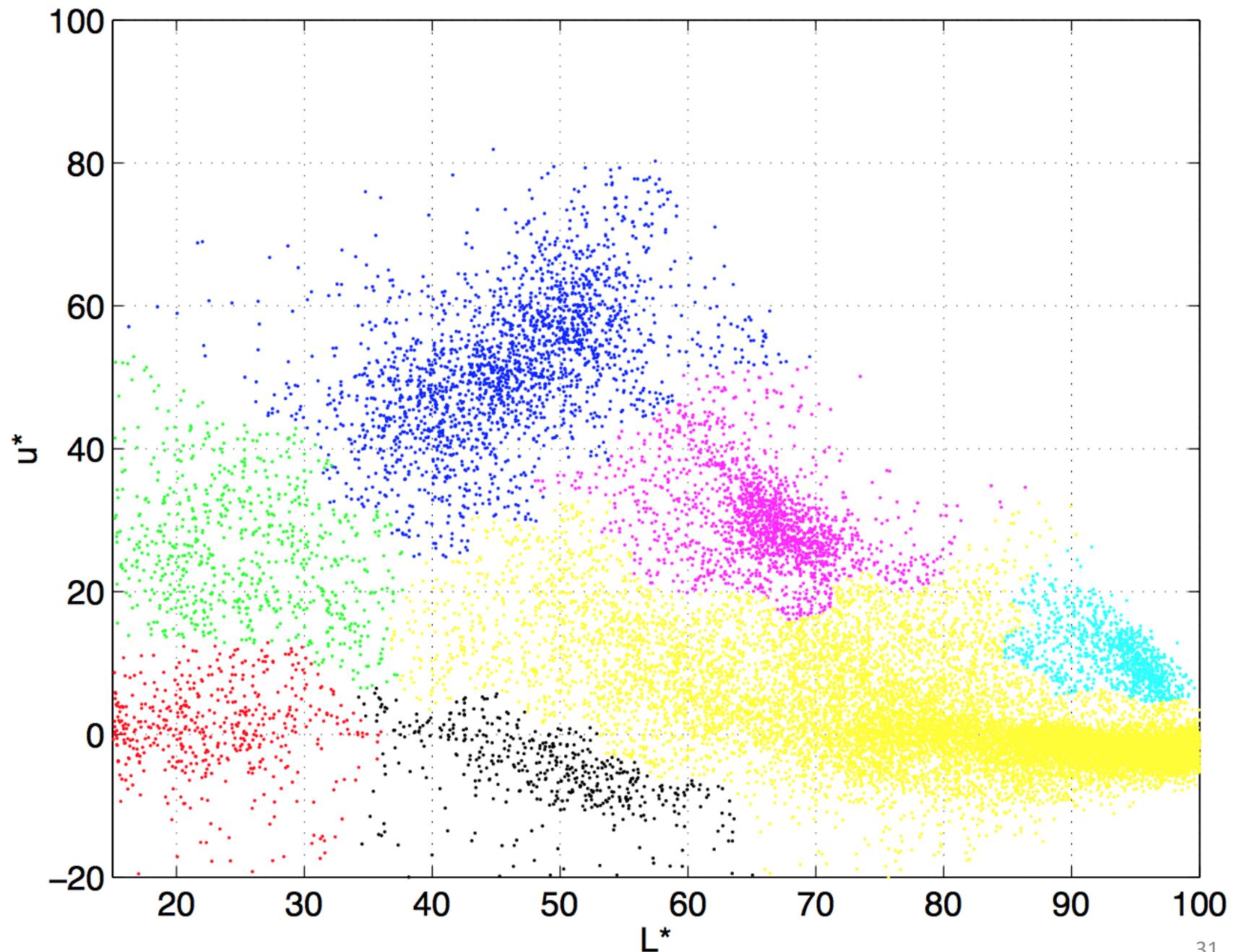
(a)



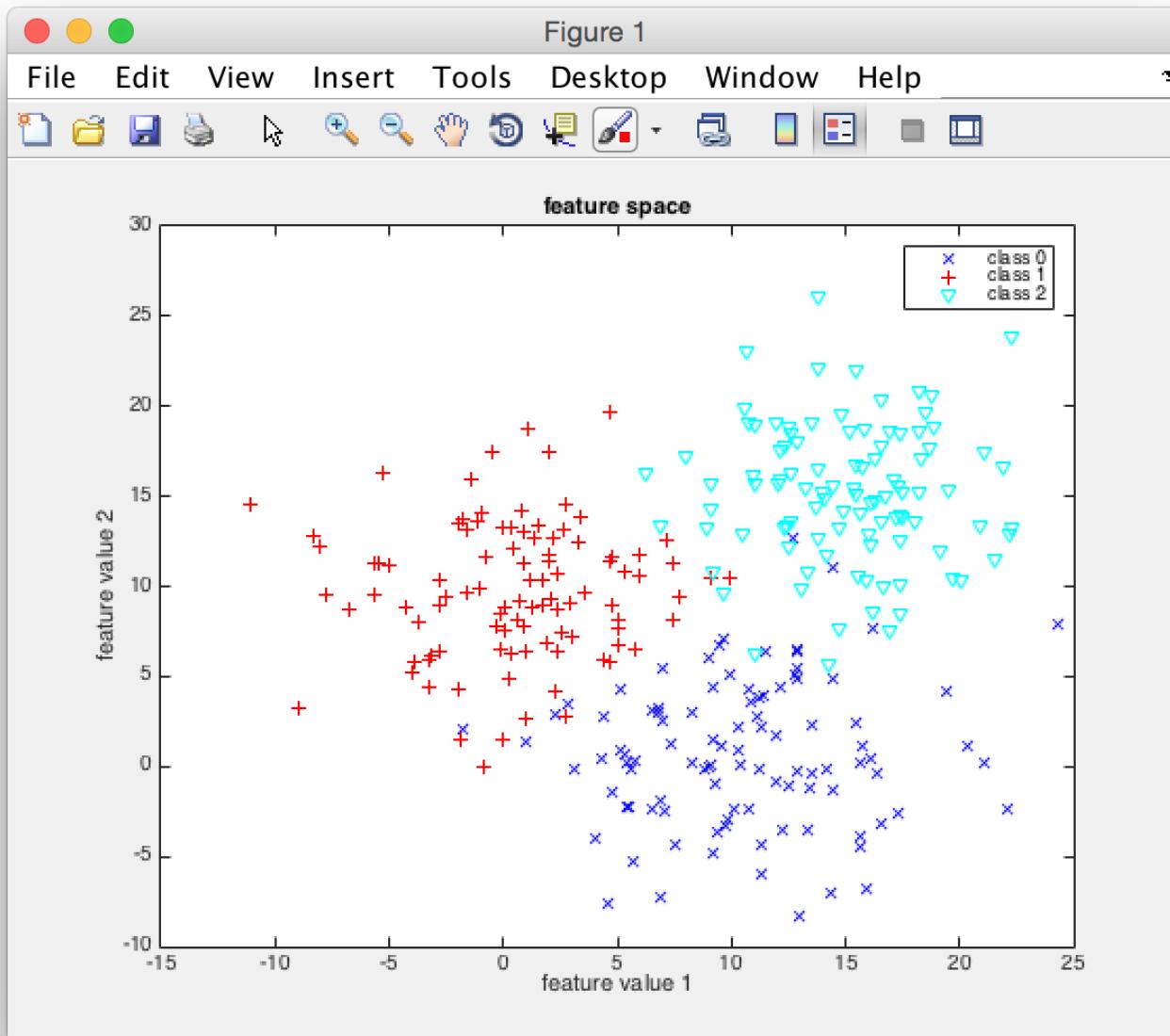
(b)

Figure 1: Example of a feature space. (a) A 400×276 color image. (b) Corresponding $L^*u^*v^*$ color space with 110, 400 data points.

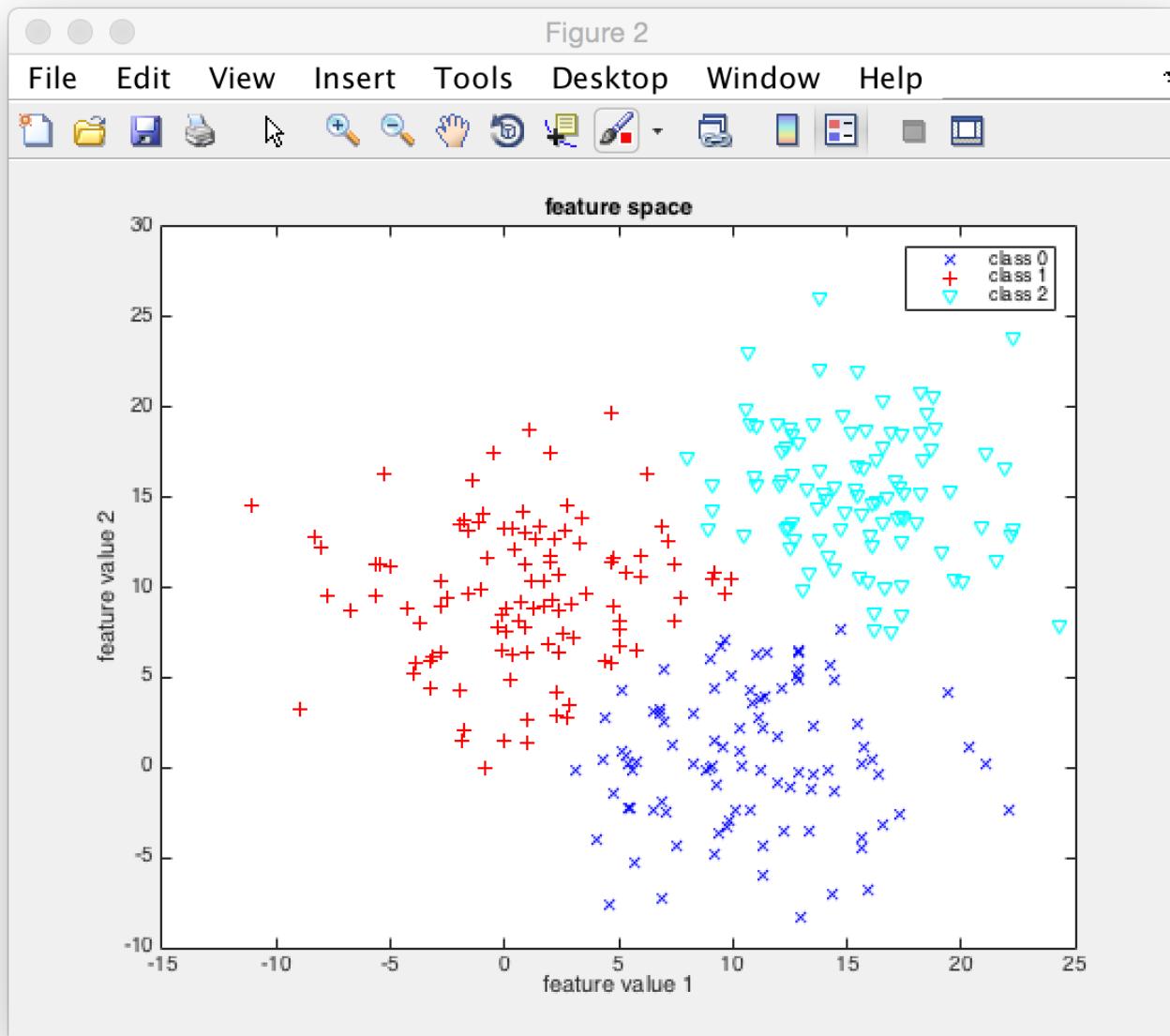




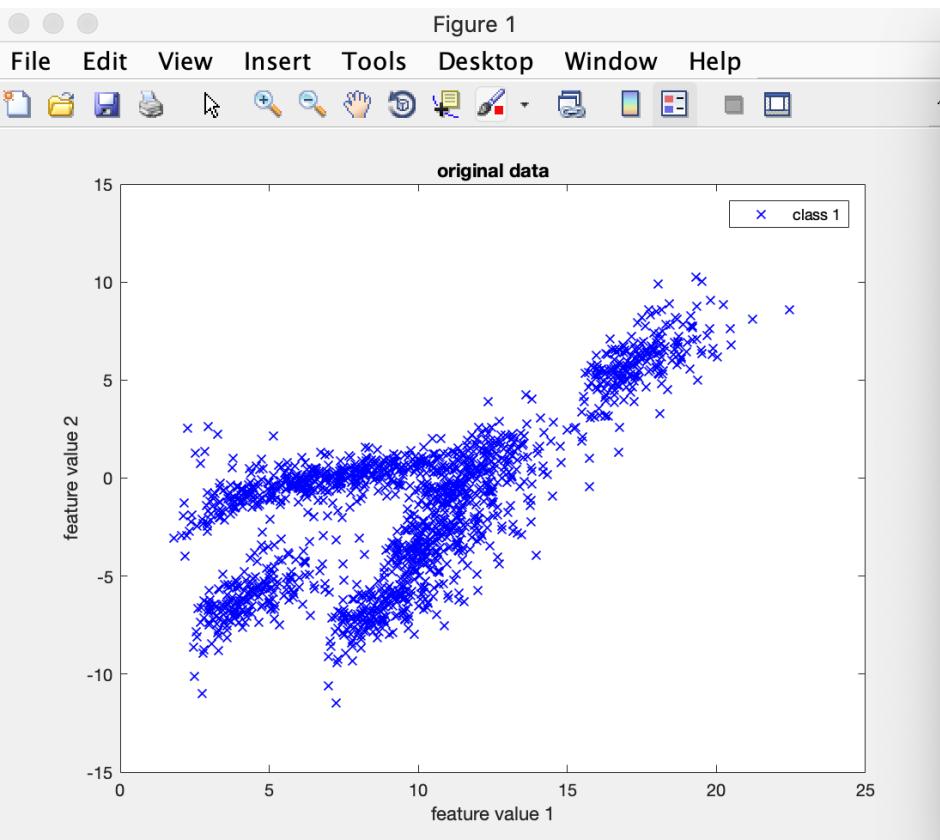
Original Samples



Clustered Samples



INPUT



OUTPUT

