FUZZY C-MEANS ALGORITHM

Fuzzy Clustering

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CONTENT

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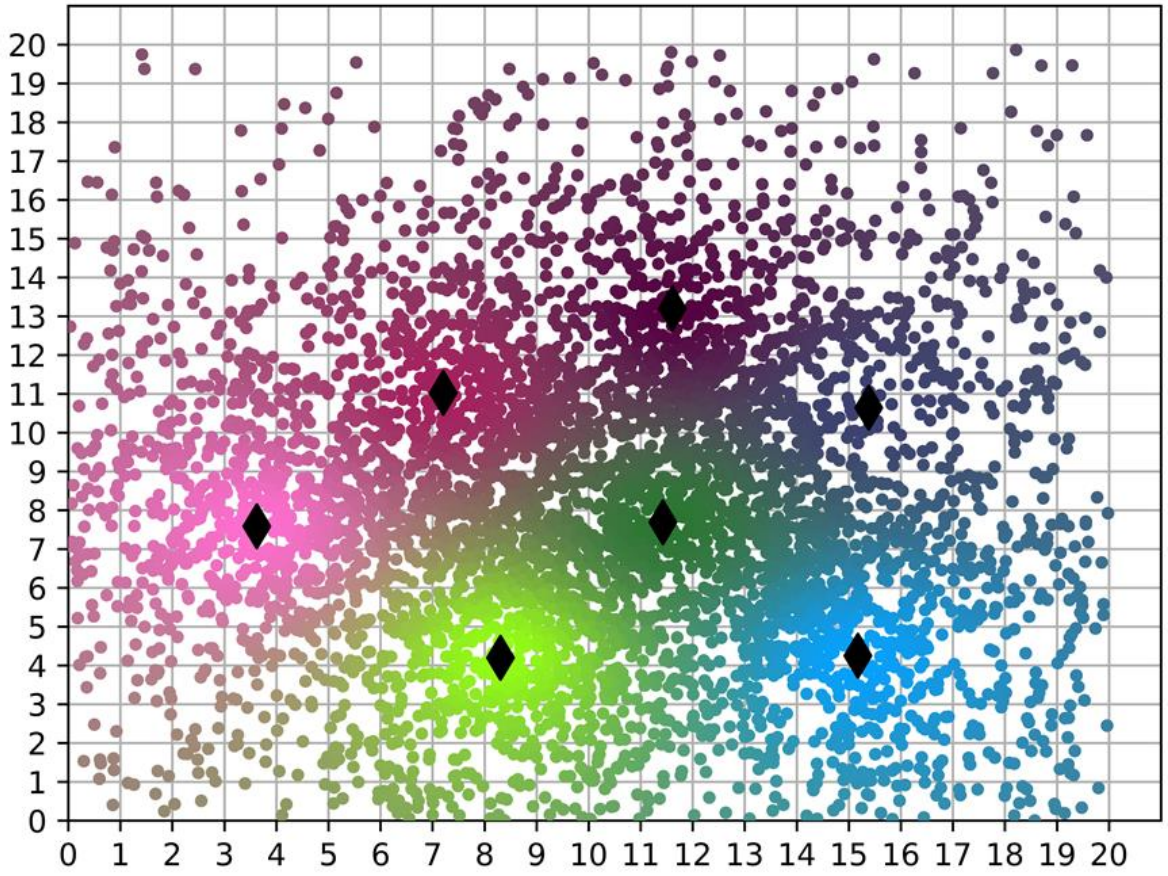
FUZZY C-MEANS ALGORITHM

The site will have relation to each center.
Iterate the following two steps from randomly specified values of μ_{ij}

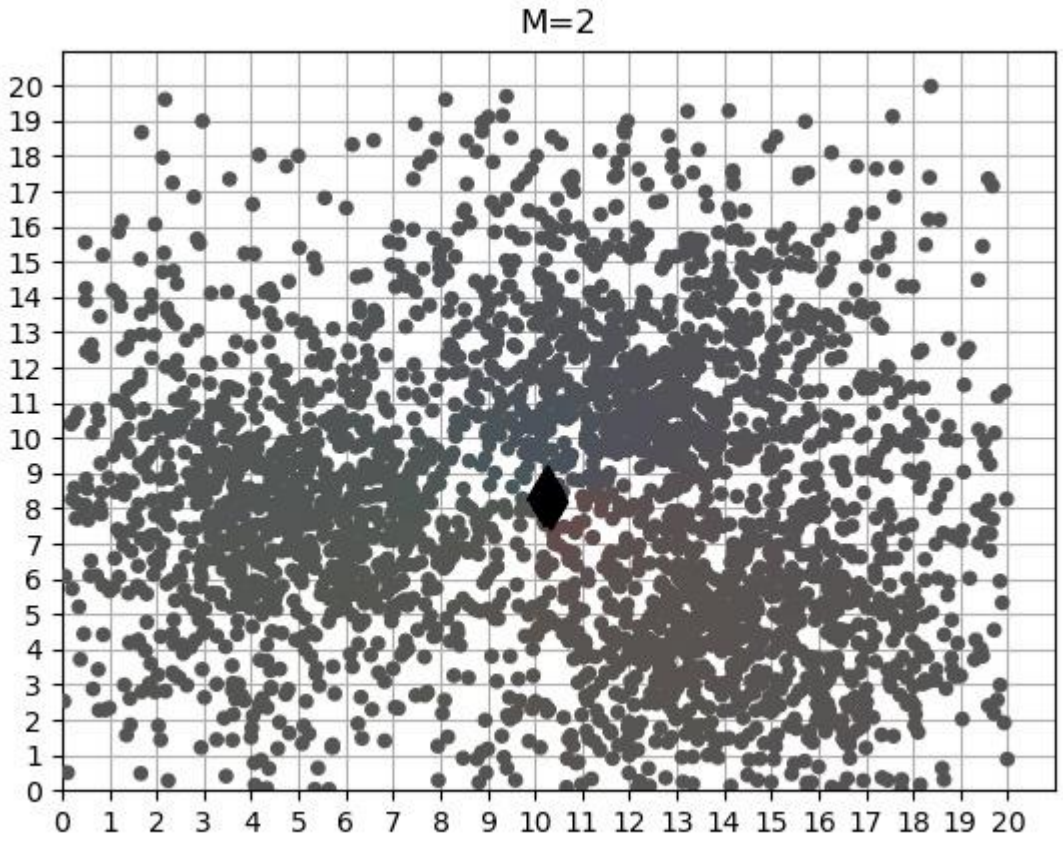
$$c_j = \frac{\sum_{i=1}^{n} (\mu_{ij})^m s_i}{\sum_{i=1}^{n} (\mu_{ij})^m}, j = 1,2, \dots, k$$

$$\mu_{ij} = \left[\sum_{h=1}^{k} \left(\frac{dist(s_i, c_j)}{dist(s_i, c_h)} \right)^{\frac{2}{m-1}} \right]^{-1} \quad \text{for all i and j}$$



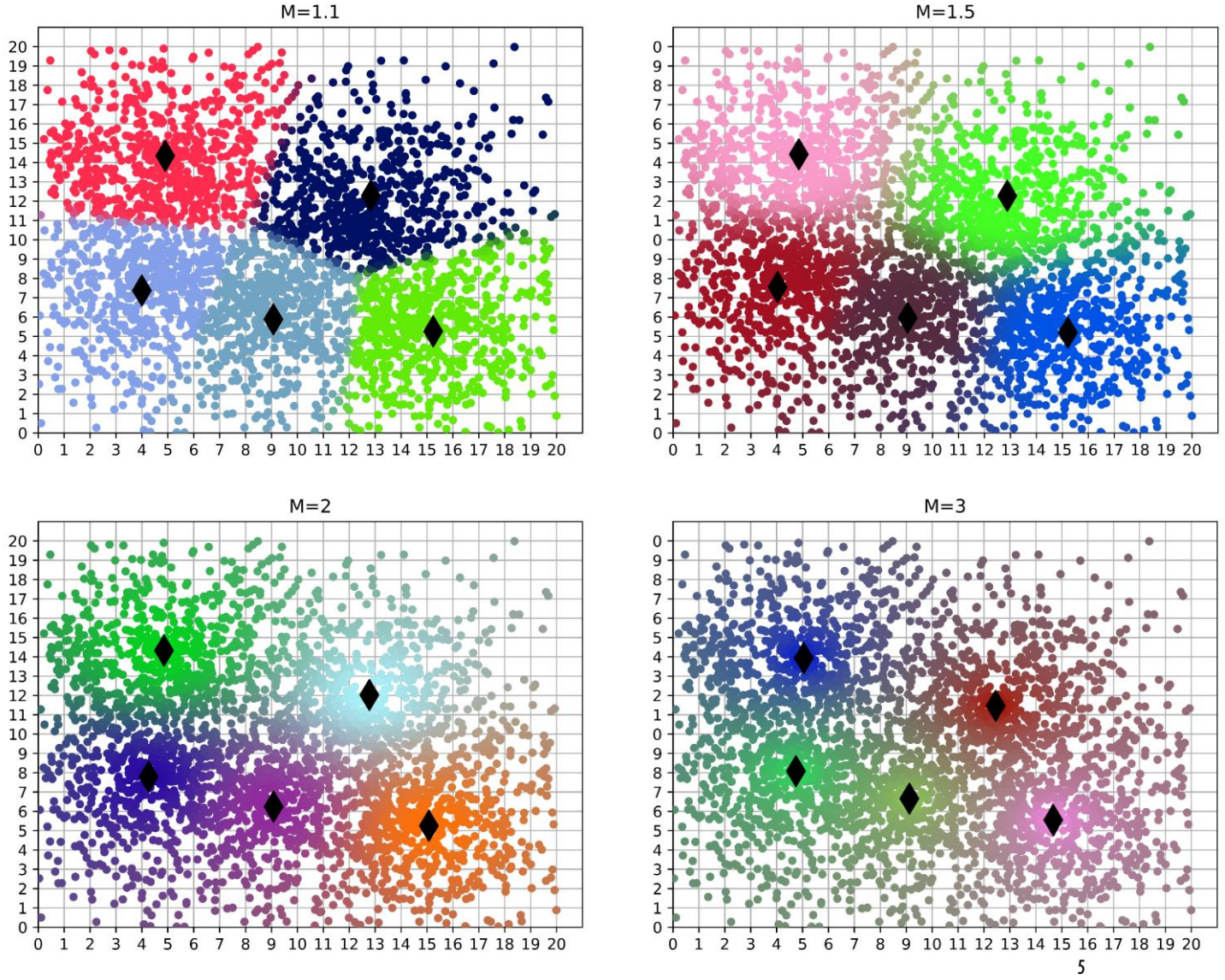
FUZZY C-MEANS ALGORITHM

- Build the map:
  - Choice some points on the map and move them away from each other.
  - Use Monte-carlo sampling to generate the map.
- Initial the cluster
  - Set all the μ_{ij} be 1. And the center will in the same location.
- Clustering:
  - Iterate and update the cluster until it is convergence

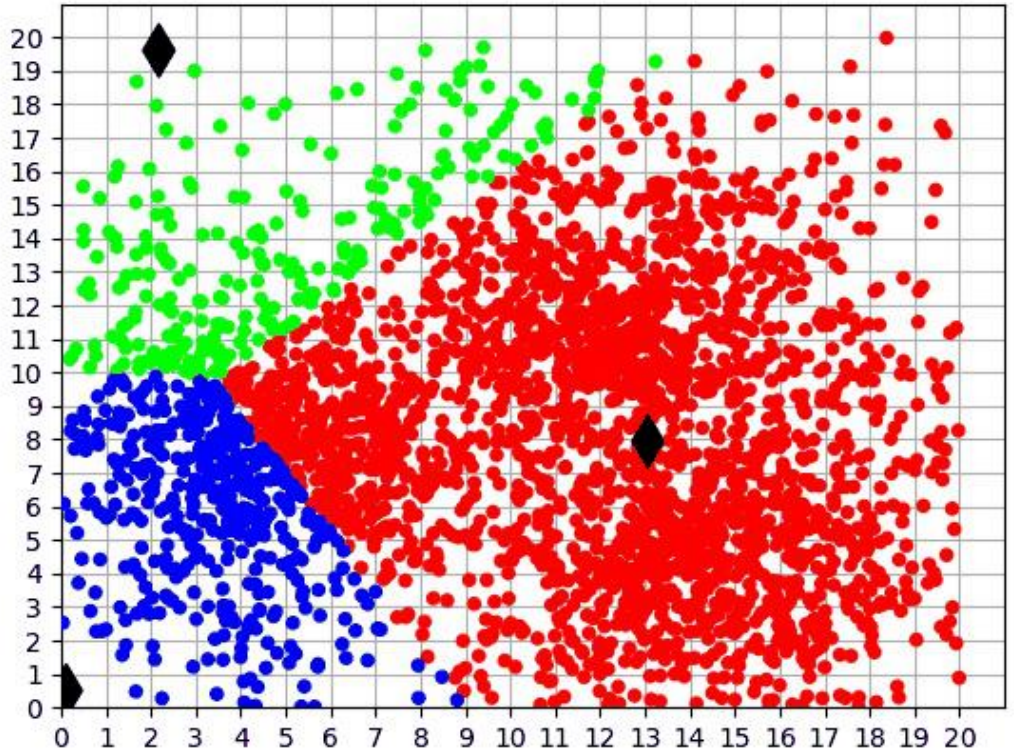


THE EFFECT OF M IN THE FUZZY C-MEANS ALGORITHM

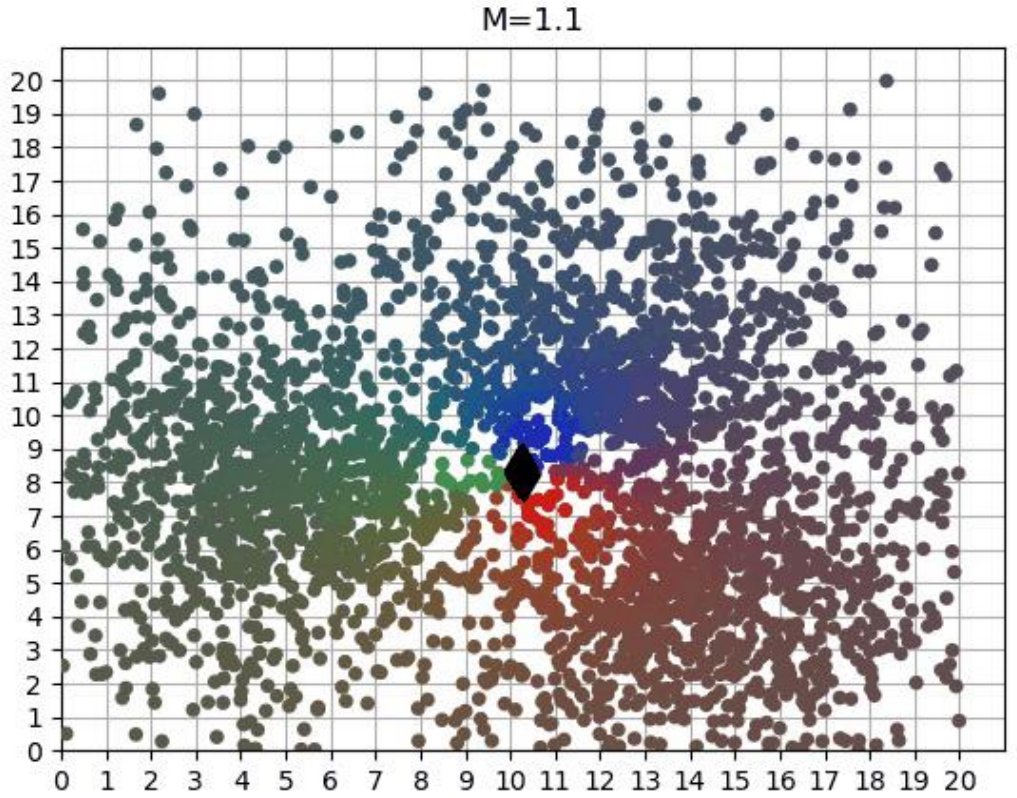
When m increase, the boundary of the colors will be more “fuzzy”



K-MEANS AND FUZZY C-MEANS ALGORITHM

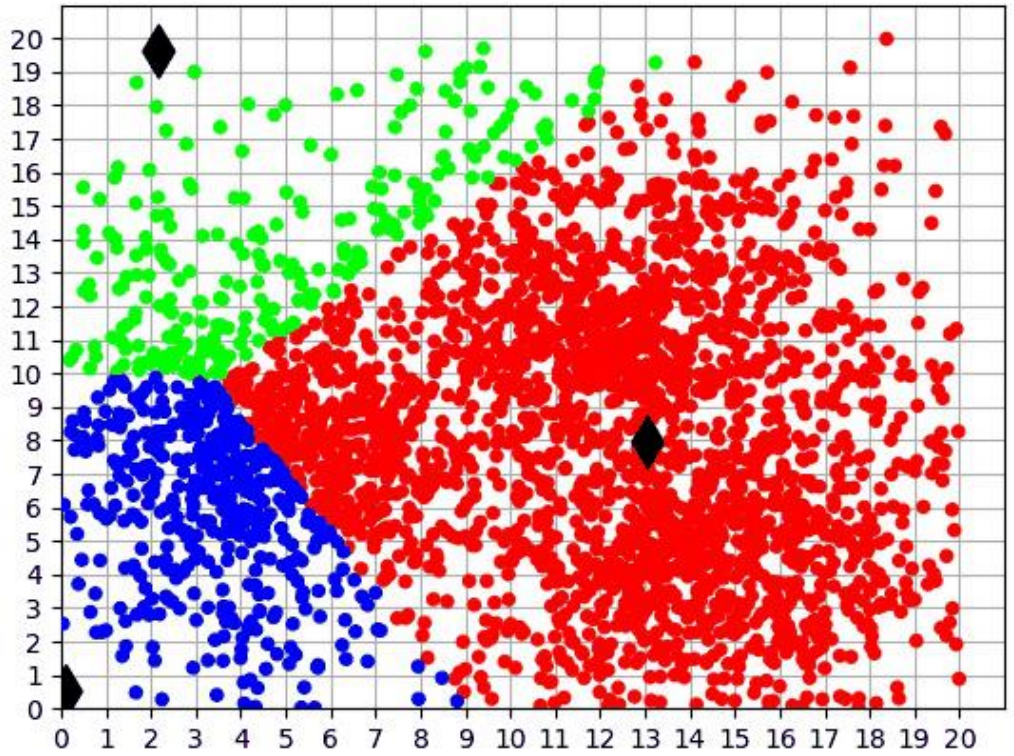


K-Means

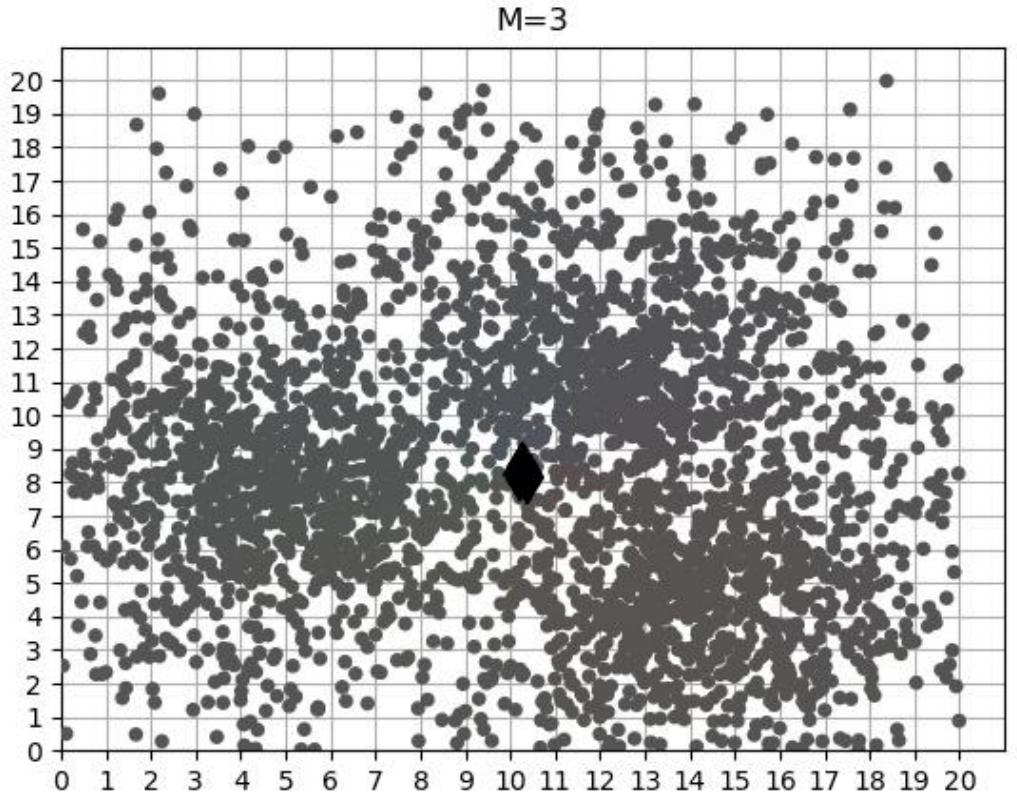


Fuzzy C-Means

K-MEANS AND FUZZY C-MEANS ALGORITHM



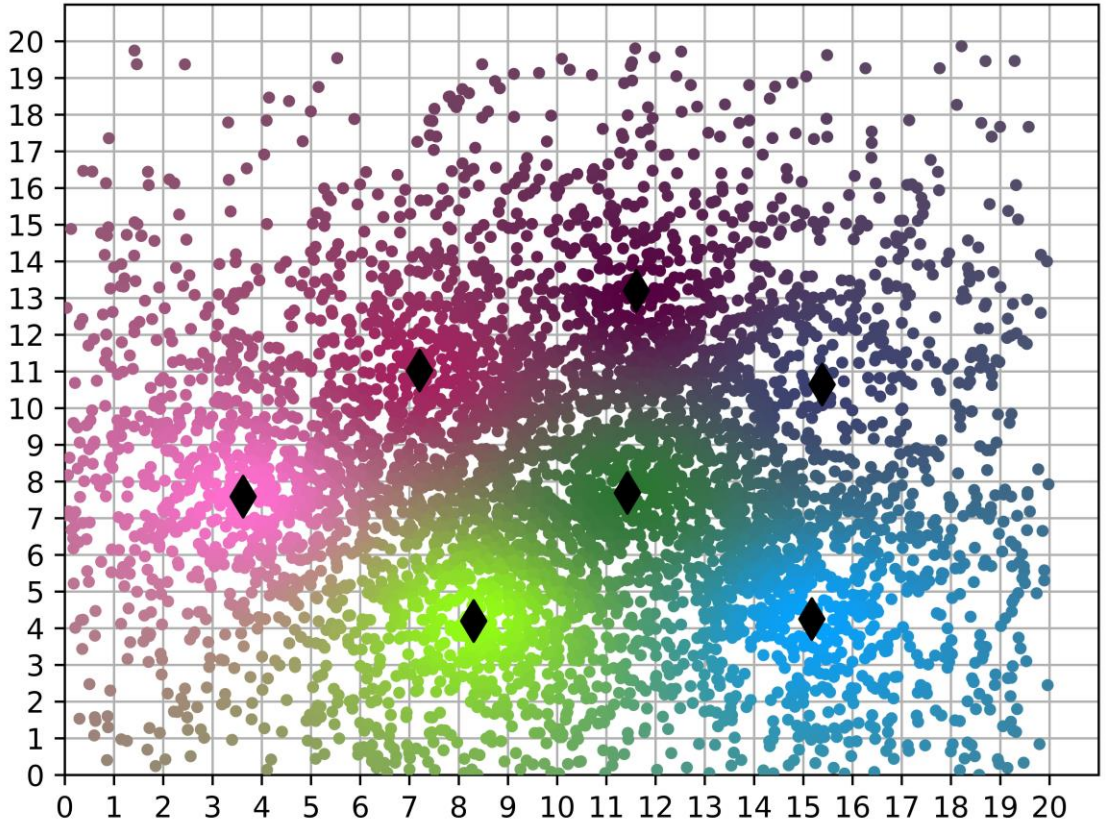
K-Means

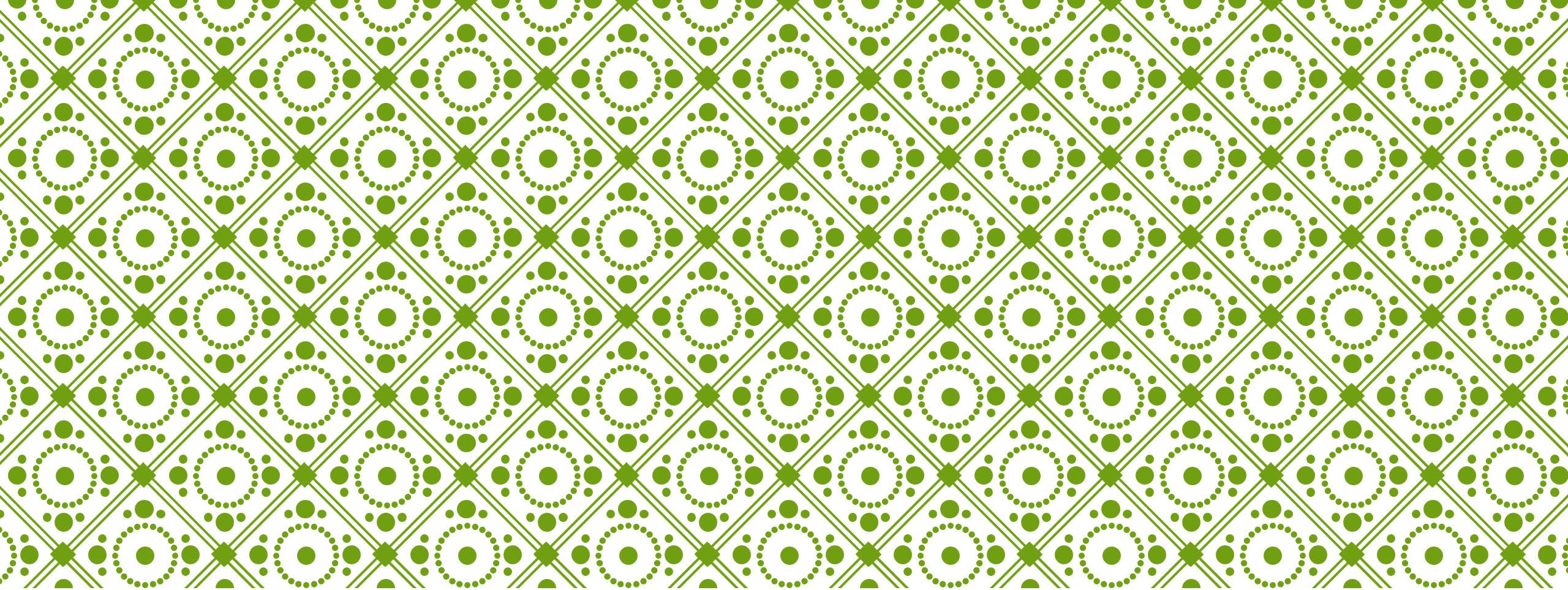


Fuzzy C-Means

K-MEANS AND FUZZY C-MEANS ALGORITHM

- K-Means: In the K-Means, each site only in one partition. it is only related to one center.
- Fuzzy C-Means: In the Fuzzy C-Means, a site have relations to all the centers, the distance is closer, the relation is stronger.





THANK YOU !

Q&A

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