Robotic Vision: Homework 4

Distance formula:

Question #1)

Table

Description automatically generated

Question #2) Picture showing work is on the next page…   
Legend: Red – Blake, Orange – Grace, Green – Peter, Blue – Lebron

Table

Description automatically generated

Text, letter

Description automatically generated

Table

Description automatically generated

A piece of paper with writing

Description automatically generated with medium confidence

Question 3) For the cluster it’s K = 4, I choose Grace, David, Jared, and Claire as seeds (in the respective order).

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| --- | --- | --- | --- | --- | --- | --- |
| **Name** | **(Age, Height)** | **(12, 5)** | **(16, 5.6)** | **(27, 6.1)** | **(8, 4.5)** | **Cluster** |
|  |  | Distance mean 1 | Distance mean 2 | Distance mean 3 | Distance mean 4 |  |
| Carlos | (24, 6.2) | 24.00 | 14.00 | 4.00 | 33.00 | 3 |
| Jhon | (2, 2.4) | 36.00 | 46.00 | 62.00 | 27.00 | 4 |
| Jessica | (41, 5.1) | 29.99 | 30.00 | 24.00 | 39.00 | 3 |
| Kennedy | (12, 4.4) | 5.99 | 15.99 | 31.99 | 4.99 | 4 |
| Peter | (19, 6) | 17.00 | 7.00 | 8.99 | 26.00 | 2 |
| Lathia | (17, 5.3) | 7.99 | 3.99 | 18.00 | 17.00 | 2 |
| Nancy | (13,4.8) | 3.00 | 10.99 | 27.00 | 7.99 | 1 |
| Ana | (22,5.8) | 18.00 | 8.00 | 7.99 | 27.00 | 3 |
| Jared | (27, 6.1) | 25.99 | 16.00 | 0.00 | 35.00 | 3 |
| Lebron | (35, 6.6) | 39.00 | 29.00 | 13.00 | 48.00 | 3 |
| David | (16, 5.6) | 9.99 | 0.00 | 16.00 | 18.99 | 2 |
| Henry | (8, 4.6) | 8.00 | 18.00 | 34.00 | 0.99 | 4 |
| Claire | (8, 4.5) | 9.00 | 18.99 | 35.00 | 0.00 | 4 |
| Jude | (10, 4.9) | 2.99 | 12.99 | 28.99 | 6.00 | 1 |
| Grace | (12, 5) | 0.00 | 9.99 | 25.99 | 9.00 | 1 |
| Mason | (14, 5.5) | 7.00 | 2.99 | 18.99 | 16.00 | 2 |
| Blake | (5, 4.3) | 14.00 | 24.00 | 40.00 | 5.00 | 4 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Iteration #2** | **(Age, Height)** | **(11.67, 4.9)** | **(16.5, 5.6)** | **(27, 6.175)** | **(7, 3.16)** | **Cluster** |
| Name |  | Distance mean 1 | Distance mean 2 | Distance mean 3 | Distance mean 4 |  |
| Carlos | (24, 6.2) | 25.33 | 13.50 | 3.25 | 47.40 | 3 |
| Jhon | (2, 2.4) | 34.67 | 46.50 | 62.75 | 12.60 | 4 |
| Jessica | (41, 5.1) | 31.33 | 29.50 | 19.80 | 53.40 | 3 |
| Kennedy | (12, 4.4) | 5.33 | 16.50 | 33.40 | 17.40 | 1 |
| Peter | (19, 6) | 18.33 | 6.50 | 11.20 | 40.40 | 2 |
| Lathia | (17, 5.3) | 9.33 | 3.50 | 19.40 | 31.40 | 2 |
| Nancy | (13,4.8) | 2.33 | 11.50 | 28.40 | 22.40 | 1 |
| Ana | (22,5.8) | 19.33 | 7.50 | 9.40 | 41.40 | 2 |
| Jared | (27, 6.1) | 27.33 | 15.50 | 4.20 | 49.40 | 3 |
| Lebron | (35, 6.6) | 40.33 | 28.50 | 11.60 | 62.40 | 3 |
| David | (16, 5.6) | 11.33 | 0.50 | 17.40 | 33.40 | 2 |
| Henry | (8, 4.6) | 6.67 | 18.50 | 34.75 | 15.40 | 1 |
| Claire | (8, 4.5) | 7.67 | 19.50 | 36.40 | 14.40 | 1 |
| Jude | (10, 4.9) | 1.67 | 13.50 | 30.40 | 20.40 | 1 |
| Grace | (12, 5) | 1.33 | 10.50 | 27.40 | 23.40 | 1 |
| Mason | (14, 5.5) | 8.33 | 3.50 | 20.40 | 30.40 | 2 |
| Blake | (5, 4.3) | 12.67 | 24.50 | 41.40 | 13.40 | 1 |
|  |  |  |  |  |  |  |
| **Iteration #3** | **(Age, Height)** | **(9.71, 4.64)** | **(15.2, 5.64)** | **(31.75, 6)** | **(2, 2.4)** | **Cluster** |
| Name |  | Distance mean 1 | Distance mean 2 | Distance mean 3 | Distance mean 4 |  |
| Carlos | (24, 6.2) | 25.33 | 13.50 | 8.20 | 47.40 | 3 |
| Jhon | (2, 2.4) | 34.67 | 46.50 | 63.40 | 12.60 | 4 |
| Jessica | (41, 5.1) | 31.33 | 29.50 | 19.80 | 53.40 | 3 |
| Kennedy | (12, 4.4) | 5.33 | 16.50 | 33.40 | 17.40 | 1 |
| Peter | (19, 6) | 18.33 | 6.50 | 11.20 | 40.40 | 2 |
| Lathia | (17, 5.3) | 9.33 | 3.50 | 19.40 | 31.40 | 2 |
| Nancy | (13,4.8) | 2.33 | 11.50 | 28.40 | 22.40 | 1 |
| Ana | (22,5.8) | 19.33 | 7.50 | 9.40 | 41.40 | 2 |
| Jared | (27, 6.1) | 27.33 | 15.50 | 4.20 | 49.40 | 3 |
| Lebron | (35, 6.6) | 40.33 | 28.50 | 11.60 | 62.40 | 3 |
| David | (16, 5.6) | 11.33 | 0.50 | 17.40 | 33.40 | 2 |
| Henry | (8, 4.6) | 6.67 | 18.50 | 35.40 | 15.40 | 1 |
| Claire | (8, 4.5) | 7.67 | 19.50 | 36.40 | 14.40 | 1 |
| Jude | (10, 4.9) | 1.67 | 13.50 | 30.40 | 20.40 | 1 |
| Grace | (12, 5) | 1.33 | 10.50 | 27.40 | 23.40 | 1 |
| Mason | (14, 5.5) | 8.33 | 3.50 | 20.40 | 30.40 | 2 |
| Blake | (5, 4.3) | 12.67 | 24.50 | 41.40 | 13.40 | 1 |

We can stop at the third iteration since there are no more changes, all points stay in the same cluster. The new centers are and

Question 4)

For the cluster it’s K = 5. I choose Claire, Nancy, Lathia, and Ana and Lebron as seeds (in the respective order.

Iteration #1

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Name** | **(Age, Height)** | **(8, 4.5)** | **(13,4.8)** | **(17, 5.3)** | **(22,5.8)** | **(35, 6.6)** | **Cluster** |
|  |  | Distance mean 1 | Distance mean 2 | Distance mean 3 | Distance mean 4 | Distance Mean 5 |  |
| Carlos | (24, 6.2) | 33.00 | 25.00 | 16.00 | 6.00 | 14.99 | 4 |
| Jhon | (2, 2.4) | 27.00 | 35.00 | 44.00 | 54.00 | 75.00 | 1 |
| Jessica | (41, 5.1) | 39.00 | 31.00 | 26.00 | 26.00 | 21.00 | 5 |
| Keneddy | (12, 4.4) | 4.96 | 4.95 | 13.99 | 23.99 | 44.99 | 2 |
| Peter | (19, 6) | 26.00 | 18.00 | 9.00 | 5.00 | 21.96 | 4 |
| Lathia | (17, 5.3) | 17.00 | 9.00 | 0.00 | 10.00 | 31.00 | 3 |
| Nancy | (13,4.8) | 7.98 | 0.00 | 9.00 | 19.00 | 40.00 | 2 |
| Ana | (22,5.8) | 27.00 | 19.00 | 10.00 | 0.00 | 21.00 | 4 |
| Jared | (27, 6.1) | 35.00 | 27.00 | 18.00 | 7.90 | 13.00 | 4 |
| Lebron | (35, 6.6) | 48.00 | 40.00 | 31.00 | 21.00 | 0.00 | 5 |
| David | (16, 5.6) | 18.96 | 10.98 | 3.99 | 8.00 | 29.00 | 3 |
| Henry | (8, 4.6) | 0.99 | 7.00 | 16.00 | 26.00 | 47.00 | 1 |
| Claire | (8, 4.5) | 0.00 | 7.98 | 17.00 | 27.00 | 48.00 | 1 |
| Jude | (10, 4.9) | 6.00 | 4.00 | 10.99 | 20.90 | 41.99 | 2 |
| Grace | (12, 5) | 9.00 | 3.00 | 7.99 | 18.00 | 39.00 | 2 |
| Mason | (14, 5.5) | 16.00 | 8.00 | 5.00 | 10.99 | 31.99 | 3 |
| Blake | (5, 4.3) | 5.00 | 13.00 | 22.00 | 32.00 | 53.00 | 1 |

Iteration #2

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Iteration #1** | **(Age, Height)** | **(5.75,3.95)** | **(11.75, 4.775)** | **(15.67, 5.46)** | **(23, 6.025)** | **(38, 5.85)** | **Cluster** |
| Name |  | Distance mean 1 | Distance mean 2 | Distance mean 3 | Distance mean 4 | Distance mean 5 |  |
| Carlos | (24, 6.2) | 40.75 | 26.50 | 15.73 | 2.75 | 17.50 | 4 |
| Jhon | (2, 2.4) | 19.25 | 33.50 | 44.27 | 57.25 | 70.50 | 1 |
| Jessica | (41, 5.1) | 46.75 | 32.50 | 28.93 | 27.25 | 10.50 | 5 |
| Keneddy | (12, 4.4) | 10.75 | 4.00 | 14.27 | 27.25 | 40.50 | 2 |
| Peter | (19, 6) | 33.75 | 19.50 | 8.73 | 4.25 | 20.50 | 4 |
| Lathia | (17, 5.3) | 24.75 | 10.50 | 2.93 | 13.25 | 26.50 | 3 |
| Nancy | (13,4.8) | 15.75 | 1.50 | 9.27 | 22.25 | 35.50 | 2 |
| Ana | (22,5.8) | 34.75 | 20.50 | 9.73 | 3.25 | 16.50 | 4 |
| Jared | (27, 6.1) | 42.75 | 28.50 | 17.73 | 4.75 | 13.50 | 4 |
| Lebron | (35, 6.6) | 55.75 | 41.50 | 30.73 | 17.75 | 10.50 | 5 |
| David | (16, 5.6) | 26.75 | 12.50 | 1.73 | 11.25 | 24.50 | 3 |
| Henry | (8, 4.6) | 8.75 | 5.50 | 16.27 | 29.25 | 42.50 | 2 |
| Claire | (8, 4.5) | 7.75 | 6.50 | 17.27 | 30.25 | 43.50 | 2 |
| Jude | (10, 4.9) | 13.75 | 3.00 | 11.27 | 24.25 | 37.50 | 2 |
| Grace | (12, 5) | 16.75 | 2.50 | 8.27 | 21.25 | 34.50 | 2 |
| Mason | (14, 5.5) | 23.75 | 9.50 | 2.07 | 14.25 | 27.50 | 3 |
| Blake | (5, 4.3) | 4.25 | 11.50 | 22.27 | 35.25 | 48.50 | 1 |

Iteration #3

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Iteration #2** | **(Age, Height)** | **(3.5, 3.35)** | **(10.5, 4.7)** | **(15.67, 5.47)** | **(23, 6.025)** | **(38, 5.85)** | **Cluster** |
| Name |  | Distance mean 1 | Distance mean 2 | Distance mean 3 | Distance mean 4 | Distance mean 5 |  |
| Carlos | (24, 6.2) | 49.00 | 27.75 | 15.66 | 2.75 | 17.50 | 4 |
| Jhon | (2, 2.4) | 11.00 | 32.25 | 44.34 | 57.25 | 70.50 | 1 |
| Jessica | (41, 5.1) | 55.00 | 33.75 | 29.00 | 27.25 | 10.50 | 5 |
| Keneddy | (12, 4.4) | 19.00 | 5.25 | 14.37 | 27.25 | 40.49 | 2 |
| Peter | (19, 6) | 42.00 | 20.75 | 8.66 | 4.25 | 20.50 | 4 |
| Lathia | (17, 5.3) | 33.00 | 11.75 | 3.00 | 13.25 | 26.50 | 3 |
| Nancy | (13,4.8) | 23.99 | 2.75 | 9.34 | 22.25 | 35.50 | 2 |
| Ana | (22,5.8) | 43.00 | 21.75 | 9.66 | 3.25 | 16.50 | 4 |
| Jared | (27, 6.1) | 51.00 | 29.75 | 17.66 | 4.75 | 13.50 | 4 |
| Lebron | (35, 6.6) | 63.99 | 42.75 | 30.66 | 17.75 | 10.50 | 5 |
| David | (16, 5.6) | 35.00 | 13.75 | 1.66 | 11.25 | 24.50 | 3 |
| Henry | (8, 4.6) | 16.99 | 4.25 | 16.34 | 29.25 | 42.50 | 2 |
| Claire | (8, 4.5) | 16.00 | 5.25 | 17.34 | 30.25 | 43.50 | 2 |
| Jude | (10, 4.9) | 22.00 | 1.75 | 11.34 | 24.25 | 37.50 | 2 |
| Grace | (12, 5) | 25.00 | 3.75 | 8.34 | 21.25 | 34.50 | 2 |
| Mason | (14, 5.5) | 32.00 | 10.75 | 1.99 | 14.25 | 27.50 | 3 |
| Blake | (5, 4.3) | 10.99 | 10.25 | 22.34 | 35.25 | 48.50 | 1 |

We can stop at the third iteration since there are no more changes, all points stay in the same cluster. The new centers are and

Question #5)