**BAB IV**

**HASIL PENELITIAN**

**4.1 Hasil Pengumpulan Data**

Hasil pengumpulan data primer dari BPS (Badan Pusat Statistic) dalam 3 tahun terakhir adalah sebagai berikut :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data Komoditi Unggulan Wilayah Provinsi Gorontalo Tahun 2017 | | | | |
| No | Tahun | Nama Komoditi | Luas Panen (Ha) | Produksi (Ton) |
| 1 | 2015 | Padi Sawah | 54856 | 290230 |
| 2 | 2015 | Padi Ladang | 2029 | 5681 |
| 3 | 2015 | Jagung | 140423 | 669093 |
| 4 | 2015 | Kedelai | 3367 | 4411 |
| 5 | 2015 | Kacang Tanah | 956 | 1282 |
| 6 | 2015 | Kacang Hijau | 139 | 128 |
| 7 | 2015 | Ubi Kayu | 364 | 4537 |
| 8 | 2015 | Ubi Jalar | 201 | 2008 |
| 9 | 2016 | Padi Sawah | 57994 | 303627 |
| 10 | 2016 | Padi Ladang | 4699 | 11077 |
| 11 | 2016 | Jagung | 148816 | 719786 |
| 12 | 2016 | Kedelai | 2843 | 4273 |
| 13 | 2016 | Kacang Tanah | 1043 | 1227 |
| 14 | 2016 | Kacang Hijau | 98 | 131 |
| 15 | 2016 | Ubi Kayu | 302 | 3988 |
| 16 | 2016 | Ubi Jalar | 182 | 1903 |
| 17 | 2017 | Padi Sawah | 57223 | 323384 |
| 18 | 2017 | Padi Ladang | 2445 | 78361 |
| 19 | 2017 | Jagung | 129131 | 643512 |
| 20 | 2017 | Kedelai | 2375 | 3203 |
| 21 | 2017 | Kacang Tanah | 769 | 7562 |
| 22 | 2017 | Kacang Hijau | 8 | 96 |
| 23 | 2017 | Ubi Kayu | 197 | 2653 |
| 24 | 2017 | Ubi Jalar | 139 | 1435 |

**Tabel 4.1** Hasil pengumpulan data

**4.2 Hasil Permodelan**

Berikut Tahapan Algoritma *K-Means :*

1. Penentuan pusat awal *Cluster*

2. Perhitungan jarak pusat *Cluster*

Untuk mengukur jarak antara data dengan pusat *cluster* digunakan *Euclidian distance*, kemudian akan didapatkan matrik jarak sebagai berikut :



Dimana x = data

y = pusat cluster

3. Menentukan *Cluster* dengan jarak terdekat pada masing-masing data

4. Menghitung pusat *Cluster* baru

Contoh tabel dengan menggunakan rumus di atas:

**Tabel 4.2** Sampel data Komoditi

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | tahun | K | L | P |
| 1 | 2015 | Padi Sawah | 54856 | 290230 |
| 2 | 2015 | Padi Ladang | 2029 | 5681 |
| 3 | 2015 | Jagung | 140423 | 669093 |

Keterangan : K = Nama Komoditi

L = Luas Panen (Ha)

P = Produksi (Ton)

Penentuan Pusat Cluster

* Pusat Cluster 1 (Cenrtoid 1) = Kacang Hijau (8 dan 96)
* Pusat Cluster 2 (Centroid 2) = Ubi Jalar (139 dan 1435)
* Pusat Cluster 3 (Centroid 3) = Jagung (129131 dan 643512)

|  |  |  |
| --- | --- | --- |
| Pusat Cluster 1 | 8 | 96 |
| Pusat Cluster 2 | 139 | 1435 |
| Pusat Cluster 3 | 129131 | 643512 |

Perhitungan Jarak Pusat Cluster

Untuk mengukur jarak antara data dengan pusat *cluster* digunakan *Euclidian distance*

Perhitungan jarak pusat cluster C1

K1 C1 = 

= 

= 

= 

= 295272.8248

K2 C1 = 

= 

= 

= 

= 5939.416301

K3 C1 = 

= 

= 

= 

= 683573.9596

K4 C1 = 

= 

= 

= 

= 5468.281814

K5 C1 = 

= 

= 

= 

= 1518.321442

K6 C1 = 

= 

= 

= 

= 134.8517705

K7 C1 = 

= 

= 

= 

= 4455.246009

K8 C1 = 

= 

= 

= 

= 1921.71616

K9 C1 = 

= 

= 

= 

= 309020.1355

K10 C1 = 

= 

= 

= 

= 11941.01512

K11 C1 = 

= 

= 

= 

= 734913.2717

K12 C1 = 

= 

= 

= 

= 5048.222856

K13 C1 = 

= 

= 

= 

= 1533.096866

K14 C1 = 

= 

= 

= 

= 96.56603958

K15 C1 = 

= 

= 

= 

= 3903.088521

K16 C1 = 

= 

= 

= 

= 1815.358091

K17 C1 = 

= 

= 

= 

= 328311.8749

K18 C1 = 

= 

= 

= 

= 78302.93222

K19 C1 = 

= 

= 

= 

= 656244.5415

K20 C1 = 

= 

= 

= 

= 3905.910649

K21 C1 = 

= 

= 

= 

= 7504.683671

K22 C1 = 

= 

= 

= 

= 0

K23 C1 = 

= 

= 

= 

= 2563.975429

K24 C1 = 

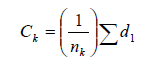
= 

= 

= 

= 1345.392879

Menetukan pusat centroid baru (Ck)



Dimana: nk = jumlah dokumen dalam cluster k.

d1 = adalah dokumen dalam cluster k.

Pusat cluster baru sebagai berikut:

|  |  |  |
| --- | --- | --- |
| Pusat Cluster 1 | 81.66666667 | 118.3333333 |
| Pusat Cluster 2 | 10665.77778 | 58380.11111 |
| Pusat Cluster 3 | 139456.6667 | 677463.6667 |

Perhitungan yang sama dilakukan pada data ke-centroid C2,C3, Sehingga menghasilkan hasil Iterasi 1,2,3,4

**4.2.1 Hasil Iterasi**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Tahun | Nama Komoditi | Jarak | | | Cluster |
| C1 | C2 | C3 |
| 1 | 2015 | Padi Sawah | 295272.8248 | 293932.819 | 361005.4669 | 2 |
| 2 | 2015 | Padi Ladang | 5939.416301 | 4647.646286 | 650371.6653 | 2 |
| 3 | 2015 | Jagung | 683573.9596 | 682236.62 | 27962.41808 | 3 |
| 4 | 2015 | Kedelai | 5468.281814 | 4390.507943 | 651357.5607 | 2 |
| 5 | 2015 | Kacang Tanah | 1518.321442 | 831.202743 | 654895.5669 | 2 |
| 6 | 2015 | Kacang Hijau | 134.8517705 | 1307 | 656187.4027 | 1 |
| 7 | 2015 | Ubi Kayu | 4455.246009 | 3110.149353 | 651820.5205 | 2 |
| 8 | 2015 | Ubi Jalar | 1921.71616 | 576.344515 | 654331.97 | 2 |
| 9 | 2016 | Padi Sawah | 309020.1355 | 307680.3632 | 347249.6019 | 2 |
| 10 | 2016 | Padi Ladang | 11941.01512 | 10665.91599 | 644559.8125 | 2 |
| 11 | 2016 | Jagung | 734913.2717 | 733575.4968 | 78773.2334 | 3 |
| 12 | 2016 | Kedelai | 5048.222856 | 3919.931122 | 651594.3202 | 2 |
| 13 | 2016 | Kacang Tanah | 1533.096866 | 927.6206121 | 654932.4828 | 2 |
| 14 | 2016 | Kacang Hijau | 96.56603958 | 1304.644396 | 656192.5222 | 1 |
| 15 | 2016 | Ubi Kayu | 3903.088521 | 2558.198194 | 652370.9511 | 2 |
| 16 | 2016 | Ubi Jalar | 1815.358091 | 469.9712757 | 654438.6552 | 2 |
| 17 | 2017 | Padi Sawah | 328311.8749 | 326970.5517 | 328104.7041 | 2 |
| 18 | 2017 | Padi Ladang | 78302.93222 | 76960.55556 | 579176.135 | 2 |
| 19 | 2017 | Jagung | 656244.5415 | 654905.9551 | 0 | 3 |
| 20 | 2017 | Kedelai | 3905.910649 | 2850.529775 | 652734.7846 | 2 |
| 21 | 2017 | Kacang Tanah | 7504.683671 | 6159.304263 | 648775.1579 | 2 |
| 22 | 2017 | Kacang Hijau | 0 | 1345.392879 | 656244.5415 | 1 |
| 23 | 2017 | Ubi Kayu | 2563.975429 | 1219.38017 | 653700.4163 | 2 |
| 24 | 2017 | Ubi Jalar | 1345.392879 | 0 | 654905.9551 | 2 |

**Tabel 4.3** Hasil Iterasi 1

**Tabel 4.4** Hasil Iterasi 2

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Tahun | Nama Komoditi | Jarak | | | Cluster |
| C1 | C2 | C3 |
| 1 | 2015 | Padi Sawah | 295237.2042 | 236023.6147 | 396367.5 | 2 |
| 2 | 2015 | Padi Ladang | 5893.671823 | 53402.15578 | 685695.5 | 1 |
| 3 | 2015 | Jagung | 683536.9738 | 624345.3927 | 8426.26 | 3 |
| 4 | 2015 | Kedelai | 5405.589905 | 54460.41784 | 686673.3 | 1 |
| 5 | 2015 | Kacang Tanah | 1455.533884 | 57917.82176 | 690220.3 | 1 |
| 6 | 2015 | Kacang Hijau | 58.14254514 | 59195.62061 | 691515 | 1 |
| 7 | 2015 | Ubi Kayu | 4427.677407 | 54819.77052 | 687151.4 | 1 |
| 8 | 2015 | Ubi Jalar | 1893.430895 | 57335.21156 | 689661.1 | 1 |
| 9 | 2016 | Padi Sawah | 308984.3833 | 249771.8902 | 382609.5 | 2 |
| 10 | 2016 | Padi Ladang | 11891.68374 | 47677.94834 | 679875.6 | 1 |
| 11 | 2016 | Jagung | 734876.4878 | 675679.8308 | 43344.86 | 3 |
| 12 | 2016 | Kedelai | 4988.608713 | 54669.69293 | 686912.6 | 1 |
| 13 | 2016 | Kacang Tanah | 1467.413901 | 57957.53585 | 690256.7 | 1 |
| 14 | 2016 | Kacang Hijau | 20.66935466 | 59199.97358 | 691520.3 | 1 |
| 15 | 2016 | Ubi Kayu | 3875.934325 | 55370.65686 | 687701.6 | 1 |
| 16 | 2016 | Ubi Jalar | 1787.484794 | 57441.91567 | 689767.8 | 1 |
| 17 | 2017 | Padi Sawah | 328277.0525 | 269062.5133 | 363503.5 | 2 |
| 18 | 2017 | Padi Ladang | 78278.35098 | 21605.95076 | 614569.9 | 2 |
| 19 | 2017 | Jagung | 656208.1535 | 597003.6317 | 35487.11 | 3 |
| 20 | 2017 | Kedelai | 3843.767191 | 55796.51052 | 688054.4 | 1 |
| 21 | 2017 | Kacang Tanah | 7475.332806 | 51772.83677 | 684107.1 | 1 |
| 22 | 2017 | Kacang Hijau | 76.97763023 | 59250.53447 | 691572.8 | 1 |
| 23 | 2017 | Ubi Kayu | 2537.28928 | 56701.90668 | 689030.3 | 1 |
| 24 | 2017 | Ubi Jalar | 1317.914346 | 57909.9191 | 690234.9 | 1 |

**Tabel 4.5** Hasil Iterasi 3

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Tahun | Nama Komoditi | Jarak | | | Cluster |
| C1 | C2 | C3 |
| 1 | 2015 | Padi Sawah | 291940.3879 | 42960.89353 | 396367.4878 | 2 |
| 2 | 2015 | Padi Ladang | 2562.729843 | 246667.7447 | 685695.4971 | 1 |
| 3 | 2015 | Jagung | 680230.9948 | 431309.3579 | 8426.260176 | 3 |
| 4 | 2015 | Kedelai | 2484.833196 | 247701.7804 | 686673.3499 | 1 |
| 5 | 2015 | Kacang Tanah | 1998.678008 | 251184.2464 | 690220.3134 | 1 |
| 6 | 2015 | Kacang Hijau | 3303.842088 | 252459.7787 | 691515.0162 | 1 |
| 7 | 2015 | Ubi Kayu | 1495.766442 | 248077.4236 | 687151.4161 | 1 |
| 8 | 2015 | Ubi Jalar | 1584.945522 | 250596.813 | 689661.1475 | 1 |
| 9 | 2016 | Padi Sawah | 305686.6279 | 56709.28639 | 382609.4868 | 2 |
| 10 | 2016 | Padi Ladang | 8571.634919 | 240908.5314 | 679875.5903 | 1 |
| 11 | 2016 | Jagung | 731571.7377 | 482600.0315 | 43344.86151 | 3 |
| 12 | 2016 | Kedelai | 1959.512788 | 247922.6005 | 686912.6346 | 1 |
| 13 | 2016 | Kacang Tanah | 2046.610918 | 251223.8764 | 690256.7439 | 1 |
| 14 | 2016 | Kacang Hijau | 3313.893083 | 252463.8075 | 691520.339 | 1 |
| 15 | 2016 | Ubi Kayu | 1118.193876 | 248628.895 | 687701.6031 | 1 |
| 16 | 2016 | Ubi Jalar | 1680.756364 | 250703.5157 | 689767.8212 | 1 |
| 17 | 2017 | Padi Sawah | 324986.0059 | 75805.13515 | 363503.4887 | 2 |
| 18 | 2017 | Padi Ladang | 75101.70901 | 175325.268 | 614569.9326 | 1 |
| 19 | 2017 | Jagung | 652905.9307 | 403874.3541 | 35487.1112 | 3 |
| 20 | 2017 | Kedelai | 1217.390754 | 249054.594 | 688054.3801 | 1 |
| 21 | 2017 | Kacang Tanah | 4309.43229 | 245027.924 | 684107.091 | 1 |
| 22 | 2017 | Kacang Hijau | 3376.688861 | 252513.6491 | 691572.763 | 1 |
| 23 | 2017 | Ubi Kayu | 1143.416661 | 249962.0587 | 689030.2538 | 1 |
| 24 | 2017 | Ubi Jalar | 2099.92017 | 251171.9665 | 690234.8661 | 1 |

**Tabel 4.6** Hasil Iterasi 4

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No | Tahun | Nama Komoditi | Jarak | | | Cluster |
| C1 | C2 | C3 |
| 1 | 2015 | Padi Sawah | 287827.5621 | 15625.12445 | 396367.4878 | 2 |
| 2 | 2015 | Padi Ladang | 1933.417271 | 305004.1616 | 685695.4971 | 1 |
| 3 | 2015 | Jagung | 676133.485 | 372869.0971 | 8426.260176 | 3 |
| 4 | 2015 | Kedelai | 3708.090031 | 306017.7019 | 686673.3499 | 1 |
| 5 | 2015 | Kacang Tanah | 6166.130383 | 309524.3552 | 690220.3134 | 1 |
| 6 | 2015 | Kacang Hijau | 7395.053573 | 310807.1779 | 691515.0162 | 1 |
| 7 | 2015 | Ubi Kayu | 3031.587265 | 306431.3871 | 687151.4161 | 1 |
| 8 | 2015 | Ubi Jalar | 5530.734772 | 308947.4069 | 689661.1475 | 1 |
| 9 | 2016 | Padi Sawah | 301575.2062 | 2488.414957 | 382609.4868 | 2 |
| 10 | 2016 | Padi Ladang | 5024.044156 | 299221.6185 | 679875.5903 | 1 |
| 11 | 2016 | Jagung | 727471.8822 | 424164.2478 | 43344.86151 | 3 |
| 12 | 2016 | Kedelai | 3555.483544 | 306245.2935 | 686912.6346 | 1 |
| 13 | 2016 | Kacang Tanah | 6217.839435 | 309562.8051 | 690256.7439 | 1 |
| 14 | 2016 | Kacang Hijau | 7398.253729 | 310811.6907 | 691520.339 | 1 |
| 15 | 2016 | Ubi Kayu | 3576.72344 | 306982.4317 | 687701.6031 | 1 |
| 16 | 2016 | Ubi Jalar | 5637.436377 | 309054.1108 | 689767.8212 | 1 |
| 17 | 2017 | Padi Sawah | 320865.1802 | 17645.02176 | 363503.4887 | 2 |
| 18 | 2017 | Padi Ladang | 70929.39184 | 233767.024 | 614569.9326 | 1 |
| 19 | 2017 | Jagung | 648801.5747 | 345445.7249 | 35487.1112 | 3 |
| 20 | 2017 | Kedelai | 4390.684597 | 307381.0336 | 688054.3801 | 1 |
| 21 | 2017 | Kacang Tanah | 477.2225327 | 303383.5268 | 684107.091 | 1 |
| 22 | 2017 | Kacang Hijau | 7447.091596 | 310862.5038 | 691572.763 | 1 |
| 23 | 2017 | Ubi Kayu | 4899.331305 | 308314.0361 | 689030.2538 | 1 |
| 24 | 2017 | Ubi Jalar | 6105.429579 | 309522.0865 | 690234.8661 | 1 |

Dengan Kesimpulan hasil iterasi ke-4 maka iterasinya berhenti karna nilainya sama dengan nilai Sebelumnya atau sama dengan iterasi 3.

**4.3 Analisis Sitem**

**4.3.1 Sistem Yang Diusulkan**



**Gambar 4.1** Bagan Alir Sistem Yang Diusulkan

**4.4 Hasil Pengembangan Sistem**

**4.4.1 Diagram Konteks**



**Gambar 4.2** Diagram Konteks

**4.4.2 Diagram Berjenjang**

Diagram Berjenjang yaitu suatu diagram yang digunakan untuk menggambarkan proses-proses yang terdapat dalam sistem, yakni menggambarkan input, proses, output yang dibutuhkan dalam sistem.



**Gambar 4.3** Diagram Berjenjang

**4.4.3 Diagram Arus Data**

**4.4.3.1 DAD Level 0**



**Gambar 4.4** DAD Level

**4.4.3.2 DAD Level 1 Proses 1**



**Gambar 4.5** DAD Level 1 Proses

**4.5 Kamus Data**

Kamus data merupakan bagian penting untuk merancang input, file-file/database dan output yang dibuat berdasarkan arus data yang mengalir pada DAD, hingga terdapat struktur arus data secara detail.

**Tabel 4.7** Kamus Data Komoditi

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Kamus Data : data\_komoditi** | | | | |
| Nama Arus Data : Data Komoditi  Penjelasan : Berisi data-data Komoditi  Periode : Setiap ada Penambahan  Komoditi (Non Periodik)  Struktur Data : | | | Bentuk Data :  Documen  Arus Data : a-1,1-F2,F2-2, a-1.2,1.2-F2 | |
| **No** | **Nama Item Data** | **Type** | **Widht** | **Description** |
| 1 | no | C | 4 | No urut data komoditi |
| 2 | nama\_komoditi | C | 4 | Nama data komoditi |
| 3 | luas\_panen | N | 5 | Luas panen data komoditi |
| 4 | produksi | N | 5 | Produksi data komoditi |

**Tabel 4.8** Kamus Data user

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Kamus Data : user** | | | | |
| Nama Arus Data : Data User  Penjelasan : Berisi data-data User  Periode : Setiap ada  Penambahan  User (Non Periodik)  Struktur Data : | | | Bentuk Data :  Documen  Arus Data : a-1,1-F1  a-1.1,1.1-F1 | |
| **No** | **Nama Item Data** | **Type** | **Widht** | **Description** |
| 1 | id\_user | C | 4 | No id pengguna |
| 2 | nama\_Lengkap | C | 5 | Nama lengkap pengguna |
| 3 | username | C | 5 | Username pengguna |
| 4 | password | C | 5 | Password pengguna |
| 5 | jenis\_kelamin | C | 5 | Jenis kelamin pengguna |
| 6 | status\_admin | C | 4 | Status admin pengguna |

**Tabel 4.9** Kamus Data Centroid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Kamus Data : centroid** | | | | |
| Nama Arus Data : centroid  Penjelasan : Berisi data data  centroid  Periode : setiap ada  Penambahan  Data komoditi (Non Periodik)  Struktur Data : | | | Bentuk Data :  Documen  Arus Data : a-1,1-F3,F3-2  a-1.3,1.3-F3 | |
| **No** | **Nama Item Data** | **Type** | **Widht** | **Description** |
| 1 | id\_centroid | N | 3 | No id centroid |
| 2 | no | C | 4 | No urut data centroid |

**Tabel 4.10** Kamus Data hasil\_cluster

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Kamus Data : hasil\_cluster** | | | | |
| Nama Arus Data : hasil\_cluster  Penjelasan : berisi hasil cluster  Periode : Setiap ada penambahan komoditi baru  Struktur Data : | | | Bentuk Data :  Documen  Arus Data : 2-F5,F5-3,3-a,3-b | |
| **No** | **Nama Item Data** | **Type** | **Widht** | **Description** |
| 1 | id\_cluster | N | 4 | No id\_cluster |
| 2 | no | C | 4 | Nomor urut data hasil |
| 3 | jarak\_centroid1 | N | 10.3 | hasil jarak\_centroid1 |
| 4 | jarak\_centroid2 | N | 10.3 | hasil jarak\_centroid2 |
| 5 | jarak\_centroid3 | N | 10.3 | hasil jarak\_centroid3 |
| 6 | cluster1 | C | 4 | Hasil cluster1 |
| 7 | cluster2 | C | 4 | Hasil cluster2 |
| 8 | cluster3 | C | 4 | Hasil cluster3 |
| 9 | iterasi | N | 2 | Hasil Iterasi |

**Tabel 4.11** Kamus Data Square\_distance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Kamus Data :** square\_distance | | | | |
| Nama Arus Data : square\_distance  Penjelasan : beisi hasil perhitungan  jarak  Periode : setiap ada penambahan data komoditi  Struktur Data : | | | Bentuk Data :  Documen  Arus Data : 2-F4 | |
| **No** | **Nama Item Data** | **Type** | **Widht** | **Description** |
| 1 | id\_square | N | 4 | No id\_square |
| 2 | no | C | 4 | Nomor urut data square |
| 3 | jarak\_centroid1 | N | 10.3 | hasil jarak\_centroid1 |
| 4 | jarak\_centroid2 | N | 10.3 | hasil jarak\_centroid2 |
| 5 | jarak\_centroid3 | N | 10.3 | hasil jarak\_centroid3 |
| 6 | min\_distance | N | 10.3 | Hasil min\_distance |
| 7 | cluster | C | 4 | Hasil cluster |

**4.6. Arsitektur System**

Untuk memenuhi agar aplikasi dapat berjalan dengan baik diperlukan menggunakan perangkat *hardware* dan *software* sebagai berikut :

1. Proccessor : Intel Core i3
2. Ram : 2GB
3. VGA : 16 Bit
4. Harddisk : 500GB
5. OS : Windows 7 64 Bit
6. Tools : Google Crome

**4.7. Interface Design**

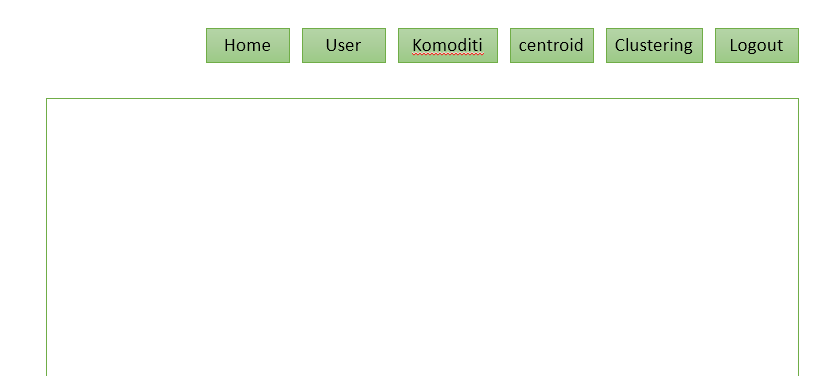
**4.7.1. Mekanisme User**

**Tabel. 4.12** Mekanisme User

|  |  |  |  |
| --- | --- | --- | --- |
| **User** | **Katagori** | **Akses Input** | **Akses Output** |
| **Admin** | **Administrator** | **All** | **All** |
| **User** | **User** | **Tidak ada** | **Hasil Cluster** |

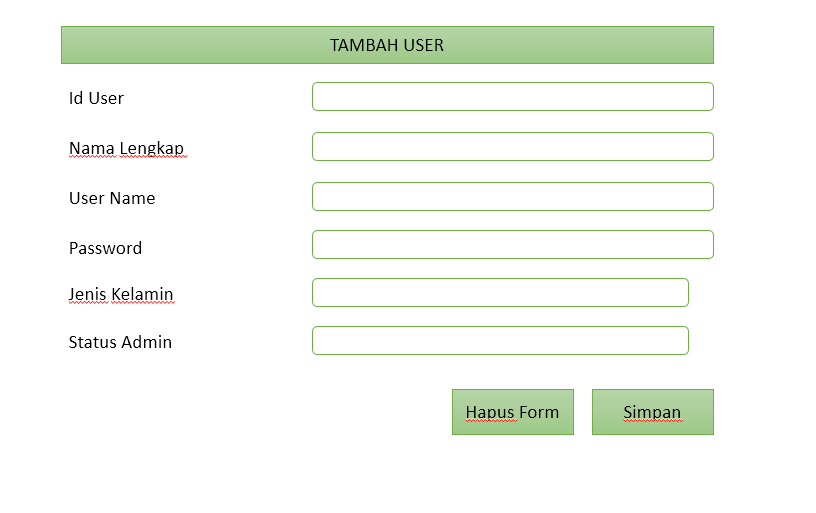
**4.7.2. Mekanisme Navigasi**

**Gambar 4.6** Mekanisme Navigasi Home



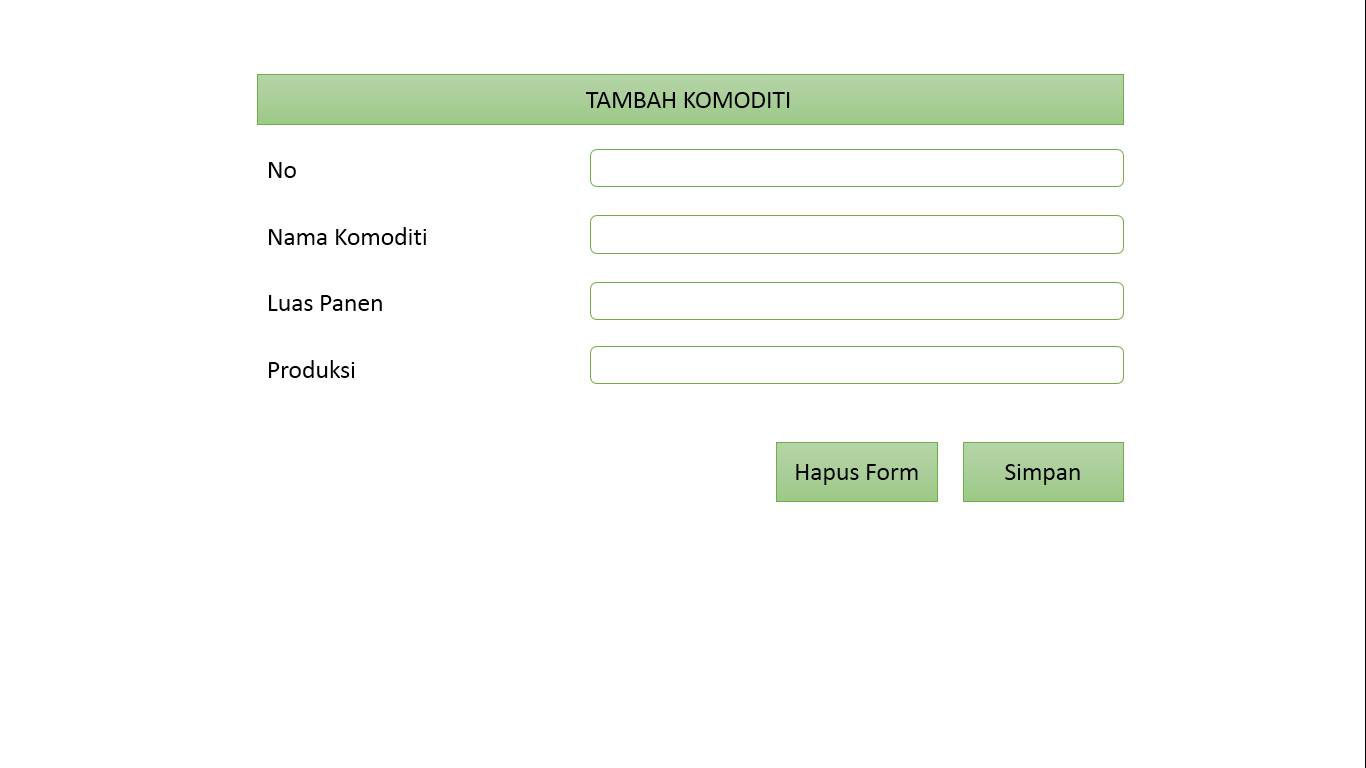
**4.7.3 Mekanisme Input User**

**Gambar 4.7** Mekanisme Input User



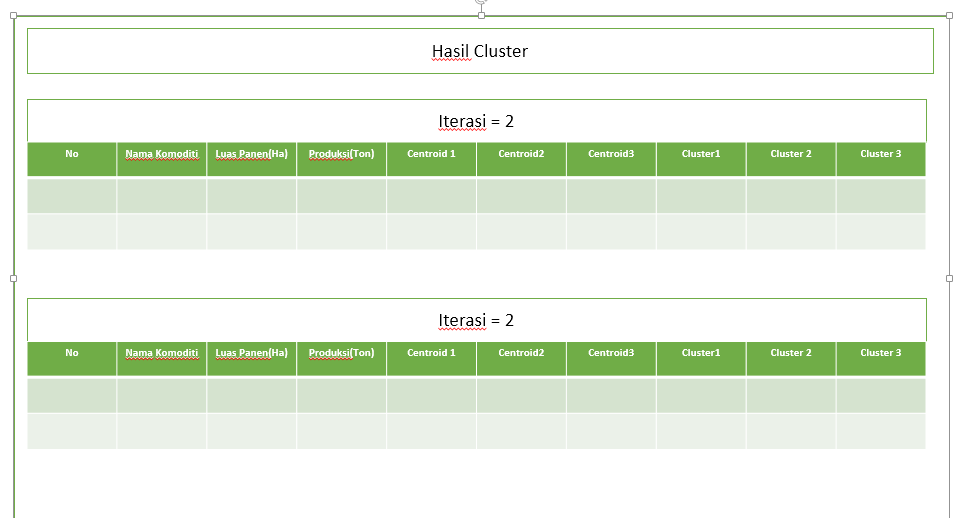
**4.7.4 Mekanisme Input Data Komoditi**

**Gambar 4.8** Mekanisme Input Data Komoditi



**4.7.5 Mekanisme Output**

**Gambar 4.9** Mekanisme Output Cluster



**4.8 Data Desain**

**4.8.1 Struktur Data**

**Tabel 4.13** Tabel Data Komoditi

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nama File : data\_komoditi  Tipe File : Induk  Organisasi : Index | | | | |
| **No** | **Filed Name** | **Type** | **Widht** | **Index** |
| 1 | No | Varchar | 4 | Primary Key |
| 2 | nama\_komoditi | Varchar | 4 |  |
| 3 | luas\_panen | Integer | 5 |  |
| 4 | Produksi | Integer | 5 |  |

**Tabel 4.14** Tabel user

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nama File : user  Tipe File : induk  Organisasi : index | | | | |
| **No** | **Filed Name** | **Type** | **Widht** | **Index** |
| 1 | id\_user | Varchar | 5 | Primary Key |
| 2 | nama\_Lengkap | Varchar | 100 |  |
| 3 | username | Varchar | 50 |  |
| 4 | password | Varchar | 100 |  |
| 5 | jenis\_kelamin | Varchar | 50 |  |
| 6 | status\_admin | Varchar | 50 |  |

**Tabel 4.15** Tabel Centroid

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nama File : centroid  Tipe File : induk  Organisasi : index | | | | |
| **No** | **Filed Name** | **Type** | **Widht** | **Index** |
| 1 | Id\_centroid | integer | 3 | Primary Key |
| 2 | no | Varchar | 4 | Foreign Key |

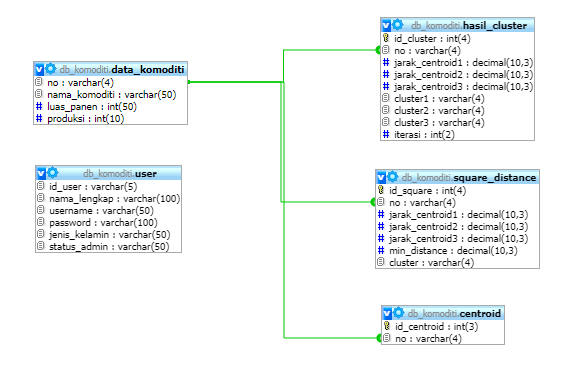
**Tabel 4.16** Tabel square\_distance

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nama File : square\_distance  Tipe File : induk  Organisasi : index | | | | |
| **No** | **Filed Name** | **Type** | **Widht** | **Index** |
| 1 | id\_square | Integer | 4 | Primary Key |
| 2 | no | Varchar | 4 | Foreign Key |
| 3 | jarak\_centroid1 | Decimal | 10.3 |  |
| 4 | jarak\_centroid2 | Decimal | 10.3 |  |
| 5 | jarak\_centroid3 | Decimal | 10.3 |  |
| 6 | min\_distance | Decimal | 10.3 |  |
| 7 | cluster | Varchar | 4 |  |

**Tabel 4.17** Tabel Hasil Cluster

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nama File : hasil\_cluster  Tipe File : induk  Organisasi : index | | | | |
| **No** | **Filed Name** | **Type** | **Widht** | **Index** |
| 1 | Id\_cluster | Integer | 4 | Primary Key |
| 2 | no | Varchar | 4 | Foreign Key |
| 3 | jarak\_centroid1 | Decimal | 10.3 |  |
| 4 | jarak\_centroid2 | Decimal | 10.3 |  |
| 5 | jarak\_centroid3 | Decimal | 10.3 |  |
| 6 | Cluster1 | Varchar | 4 |  |
| 7 | Cluster2 | Varchar | 4 |  |
| 8 | Cluster3 | Varchar | 4 |  |
| 9 | iterasi | Integer | 2 |  |

**4.9 Relasi**



**Gambar 4.10** Tabel Relasi

**4.10 Hasil Pengujian Sistem**

**4.10.1 Pengujian *White Box***

<?php 1

$sql9 = mysql\_query("TRUNCATE TABLE hasil\_cluster"); 1

$sql9 = mysql\_query("TRUNCATE TABLE square\_distance"); 1

//1. Mendefenisikan centroid 2

$queryctr = mysql\_query("select data\_komoditi.\*,centroid.\* from data\_komoditi inner join centroid on data\_komoditi.no=centroid.no”); 2

while ($rowctr = mysql\_fetch\_array($queryctr)) 3

$iterasi=1; 4

//2. Memanggil data\_komoditi; 4

$sqla = mysql\_query("SELECT \* from data\_komoditi order by no asc"); 4

while ($dta = mysql\_fetch\_array($sqla)) 5

{ 6

$no=$dta['no']; 6

$nama\_komoditi=$dta['nama\_komoditi']; 6

$x1=$dta['luas\_panen']; 6

$x2=$dta['produksi']; 6

} 6

//mencari jarak 7

$jarakm1=sqrt((pow(($x1-$centroid11),2))+(pow(($x2-$centroid12),2))); 7

$jarakm2=sqrt((pow(($x1-$centroid21),2))+(pow(($x2-$centroid22),2))); 7

$jarakm3=sqrt((pow(($x1-$centroid31),2))+(pow(($x2-$centroid32),2))); 7

//3. memasukkan hasil perhitungan jarak pada setiap datatraining ke tabel 8

1square\_distance\_1. 8

$jarakmin=min($jarakm1,$jarakm2,$jarakm3); 8

$query = "INSERT INTO square\_distance(no,jarak\_centroid1,jarak\_centroid2,jarak\_centroid3,min\_distance)VALUES('$no','$jarakm1','$jarakm2','$jarakm3','$jarakmin')"; 8

$hasil = mysql\_query($query); 8

//4.memasukkan hasil cluster 8

$query2 = "INSERT INTO hasil\_cluster (no,jarak\_centroid1,jarak\_centroid2,jarak\_centroid3)VALUES('$no','$jarakm1','$jarakm2','$jarakm3')"; 8

$hasil2 = mysql\_query($query2); 8

if (($jarakm1<$jarakm2)and ($jarakm1<$jarakm3)) 9

{ 10

$cluster="C1"; 10

} 10

else if (($jarakm2<$jarakm1)and ($jarakm2<$jarakm3)) 11

{ 12

$cluster="C2"; 12

} 12

else if (($jarakm3<$jarakm1)and ($jarakm3<$jarakm2)) 13

{ 14

$cluster="C3"; 14

} 14

$update = mysql\_query("update hasil\_cluster set cluster3='C3',iterasi='$iterasi' where id\_cluster='$id\_cluster'"); 15

} 15

} 15

} 16

Mysql close; 17

**4.10.2 Flowchart**



**Gambar 4.11** Flowchart perhitungan Jarak

**4.10.3 Flowgraph**



**Gambar 4.12** Flowgraph perhitungan Jarak

**4.10.4 Perhitungan CC pada pengujian *White Box***

Dari Flowgraph tersebut didapatkan

Diketahui Region(R) = 6

Node (N) = 17

Edge(E) = 21

Predikat Node(P) = 5

Rumus: V(G) = E-N+2

Atau V(G) =P+1

Penyelasaian: V(G) = 21-17+2 = 6

V(G) = 5+1 = 6

(R1,R2,R3,R4,R5,R6)

**Path pada pengujian White Box**

Tabel 4.6 Basis Path

**4.8.5 Pengujian Black Box**

Tabel 4.7 Tabel Pengujian *Black Box*

**4.10.5 Path pada pengujian White box**

**Tabel 4.18** Basis Path

|  |  |  |
| --- | --- | --- |
| **NO** | **PATH** | **KET** |
| **1** | 1-2-3-17 | **OK** |
| **2** | 1-2-3-4-5-6-8-9-10-12-14-16-17 | **OK** |
| **3** | 1-2-3-4-5-6-7-6… | **OK** |
| **4** | 1-2-3-4-5-6-8-9-10-11-17 | **OK** |
| **5** | 1-2-3-4-5-6-8-9-10-12-13-17 | **OK** |
| **6** | 1-2-3-4-5-6-8-9-10-12-14-16-17 | **OK** |

Pada proses aplikasi diuji, akan terlihat bahwa semua basis path yang dihasilkan telah dieksekusi satu kali, Berdasarkan Ketentuan kelayakan software, sistem ini telah memenuhi syarat.

* + 1. **Pengujian *Black Box***

**Tabel 4.19** Tabel Pengujian *Black Box*

| **Input/Event** | **Fungsi** | **Hasil Yang Diharapkan** | **Hasil Uji** |
| --- | --- | --- | --- |
| Klik Menu Home | Menampilkan halaman judul aplikasi | Menu home tampil | Sesuai |
| Klik Menu Cluster Komoditi | Menampilkan halaman hasil Cluster | Tampil halaman hasil cluster | Sesuai |
| Klik Menu Login | Menampilkan form Login | Form login | Sesuai |
| Input user name dan password salah | Login ke halaman administrator | Kembali ke halaman login | Sesuai |
| Masukkan user name dan password Benar | Login ke halaman administrator | Halaman admin Tampil | Sesuai |
| Klik Menu user | Menampilkan tabel data user mengedit, dan menghapus | Tampil halaman Tabel user  tampil | Sesuai |
| Klik input user Baru | Menampilkan Halaman Form Tambah User | Tampil Halaman Tambah User  tampil | Sesuai |
| Input Data user Lalu Klik Button Simpan | Menyimpan data user | Data user Baru tersimpan | Sesuai |
| Klik Menu Edit | Menampilkan halaman Edit data user | Tampil Halaman edit user | Sesuai |
| Ubah data user dan Klik Tombol Update | Mengupdate data user | Data user Terupdate | Sesuai |
| Klik Menu Hapus | Menghapus data data user | data user terhapus | Sesuai |
| Klik Menu Komoditi | Menampilkan tabel data Komoditi mengedit, dan menghapus | Tampil halaman Tabel Komoditi tampil | Sesuai |
| Klik input data Komoditi | Menampilkan Halaman Form Input data komoditi | Tampil Halaman Input data komoditi | Sesuai |
| Input Data Komoditi Lalu Klik Button Simpan | Menyimpan data Komoditi | Data Komoditi tersimpan | sesuai |
| Klik Menu Edit | Menampilkan halaman Edit data komoditi | Tampil Halaman edit komoditi | sesuai |
| Ubah data Komoditi dan Klik Tombol Update | Mengupdate data Komoditi | Data Komoditi Terupdate | sesuai |
| Klik Menu Hapus | Menghapus data Komoditi | data komoditi terhapus | sesuai |
| Klik Menu Centroid | Memilih Pusat Cluster | Data Komoditi jadi pusat cluster | Sesuai |
| Klik Menu Edit | Menampilkan halaman Edit data training | Tampil Halaman edit data training | Sesuai |
| Ubah data training dan Klik Tombol Update | Mengupdate data data training | Data training Terupdate | Sesuai |
| Klik Menu Hapus | Menghapus data data training | data training terhapus | Sesuai |
| Klik Menu Clustering | Menampilkan halaman Hasil Clustering | Halaman Hasil Clustering tampil | Sesuai |
| Klik Menu reset Cluster | Mengreset Hasil Cluster | Data hasil Cluster tereset | sesuai |
| Klik Menu Log Out | Keluar Dari Menu Admin | Tampil Halaman Login Kembali | Sesuai |