

Implementation Project 2(Option 1)

Project Description/Objectives: Project Implements Clustering Algorithm on 3 different datasets. The algorithm takes user input for the maximum distance allowed between any two points and the number of such instances allowed. Also, the user decides the number of clusters the dataset is clustered into.

Software used:
IDE: Netbeans.
Language: JAVA.

Source Code:

```
*
* Source code to implement clustering algorithm
*
*/

/**
*
* @author kijit
*/
public class Clustering {

    public static void main(String[] args) {

        int x[]= new int[500];
        int y[]= new int[500];
        int z[]= new int[500];

        for(int i=0;i<500;i++)
        {
            x[i]= 0 + (int)(Math.random()* 500);
            y[i]= 0 + (int)(Math.random()* 500);
            z[i]= 0 + (int)(Math.random()* 500);
            //System.out.println("x:"+x[i]+" y:"+y[i]+" z:"+z[i]);
        }

        outlier test1= new outlier();
        test1.outlier(x, y, z);
    }
}

import java.lang.* ;
import java.util.ArrayList;
```

```
import java.util.Scanner;
/*
 * Calculaing the outliers and printing them.
 */

/**
 *
 * @author kijit
 */
public class outlier {

    public static void outlier(int x[],int y[], int z[])
    {

        Scanner scan= new Scanner(System.in);
        System.out.println("Enter the Maximum Distance allowed");
        int mindist=scan.nextInt();
        System.out.println("Enter the maximum points allowed more than threshold
");
        int a=scan.nextInt();
        int dist=0 ;
        ArrayList db = new ArrayList();
        int count2=0;

        for(int i=0;i<500;i++)
        {
            int count=0;
            for(int j=1;j<500;j++)
            {
                double temp= (x[i]-x[j])*(x[i]-x[j])+(y[i]-y[j])*(y[i]-y[j])+(z[i]-z[j])*(z[i]-
z[j]);
                dist = (int)Math.sqrt(temp) ;
                if(dist>mindist)
                {
                    count++ ;
                }
            }
            if(count>=a)
            {
                System.out.println("outlier: "+"x:"+x[i]+" y:"+y[i]+" z:"+z[i]);
                count2++ ;
            }
            else
            {
                ArrayList temp = new ArrayList();
                temp.add(x[i]);
                temp.add(y[i]);
                temp.add(z[i]);
                db.add(temp);
                /*int temp[]= new int[3];
                temp[0]=x[i];
```

```
        temp[1]=y[i];
        temp[2]=z[i];
        db.add(temp);*/

    }

}

if(count2==0)
{
    System.out.println(" No Outliers found");
}
cluster test2= new cluster();
test2.cluster(db);

}

}

import java.util.ArrayList;
import java.util.Scanner;
/*
 * Clustering the points
 */

/**
 *
 * @author kijit
 */
public class cluster {

    public static void cluster(ArrayList db)
    {

        Scanner scan= new Scanner(System.in);

        ArrayList dbnew= new ArrayList() ;
        dbnew.addAll(db) ;

        int one = 0;
        int two = 0 ;
        System.out.println("Enter Number of clusters");
        int count =scan.nextInt() ;

        for(int l=0;db.size()>count;l++)
        {
            //System.out.println(db.size());
            double mindist = 10000;
            for(int i=0;i<db.size();i++)
            {
```

```
for(int j=i+1;j<db.size();j++)
{
    //for(int k=0;k<((ArrayList)db.get(i)).size();k++)
    //{
        double temp=0 ;
        int x= Integer.parseInt(((ArrayList)db.get(i)).get(0).toString())-
Integer.parseInt(((ArrayList)db.get(j)).get(0).toString());
        int y= Integer.parseInt(((ArrayList)db.get(i)).get(1).toString())-
Integer.parseInt(((ArrayList)db.get(j)).get(1).toString());
        int z= Integer.parseInt(((ArrayList)db.get(i)).get(2).toString())-
Integer.parseInt(((ArrayList)db.get(j)).get(2).toString());
        temp= Math.sqrt(x*x+y*y+z*z);
        if(temp<mindist)
        {
            mindist=temp;
            one=i ;
            two=j;
        }
    //}
}

//System.out.println(one+" "+two);
ArrayList newtemp= new ArrayList();
newtemp.add(dbnew.get(one));
newtemp.add(dbnew.get(two));
//System.out.println(db.get(two));

dbnew.remove(two);
dbnew.set(one, newtemp);

db.remove(two);

}
//System.out.println(dbnew.size());

for(int i=1;i<=dbnew.size();i++)
{
    System.out.println();
    System.out.println("Cluster "+i);

    System.out.println(dbnew.get(i-1));
    System.out.println();
}
}
}
```

Screenshot of execution of first data set:

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Output - Clustering (run)

```

run:
Enter the Maximum Distance allowed
600
Enter the maximum points allowed more than threshold
15
outlier: x:334 y:494 z:60
outlier: x:454 y:116 z:33
outlier: x:50 y:476 z:2
outlier: x:458 y:456 z:485
outlier: x:461 y:447 z:425
outlier: x:452 y:112 z:21
outlier: x:496 y:456 z:19
outlier: x:464 y:202 z:496
outlier: x:493 y:410 z:470
outlier: x:34 y:428 z:106
outlier: x:497 y:441 z:45
outlier: x:105 y:425 z:31
outlier: x:348 y:16 z:477
outlier: x:463 y:61 z:480
outlier: x:2 y:49 z:366
outlier: x:61 y:488 z:301
outlier: x:478 y:124 z:6
outlier: x:102 y:47 z:476
outlier: x:23 y:449 z:138
outlier: x:467 y:74 z:437
outlier: x:434 y:485 z:22
outlier: x:465 y:3 z:272
outlier: x:51 y:359 z:483
outlier: x:0 y:218 z:12
outlier: x:72 y:67 z:11
outlier: x:480 y:115 z:67
outlier: x:419 y:21 z:14
outlier: x:479 y:314 z:498
outlier: x:32 y:29 z:443
outlier: x:467 y:379 z:16
outlier: x:450 y:95 z:456
outlier: x:458 y:2 z:289
outlier: x:487 y:474 z:139
outlier: x:493 y:30 z:408
outlier: x:92 y:481 z:4
outlier: x:492 y:452 z:487
outlier: x:33 y:3 z:259
outlier: x:25 y:437 z:4
outlier: x:6 y:98 z:87
outlier: x:460 y:483 z:381
outlier: x:41 y:77 z:490
outlier: x:322 y:35 z:1
outlier: x:54 y:7 z:398
outlier: x:481 y:441 z:6
outlier: x:6 y:47 z:175
outlier: x:374 y:25 z:13
outlier: x:187 y:494 z:442

```

```
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Output - Clustering (run)
outlier: x:6 y:47 z:175
outlier: x:374 y:25 z:13
outlier: x:187 y:494 z:442
outlier: x:50 y:35 z:26
outlier: x:464 y:484 z:301
outlier: x:75 y:9 z:110
outlier: x:88 y:4 z:372
outlier: x:72 y:466 z:416
outlier: x:119 y:0 z:393
outlier: x:5 y:418 z:101
outlier: x:466 y:102 z:15
outlier: x:12 y:345 z:31
outlier: x:462 y:9 z:22
outlier: x:472 y:415 z:428
outlier: x:35 y:189 z:494
outlier: x:75 y:224 z:479
outlier: x:235 y:22 z:487
outlier: x:12 y:234 z:452
outlier: x:32 y:421 z:382
outlier: x:43 y:434 z:51
outlier: x:478 y:492 z:191
outlier: x:39 y:36 z:320
outlier: x:70 y:471 z:88
outlier: x:376 y:449 z:9
Enter Number of clusters
4

Cluster 1
[[[[[[[[[42, 362, 282], [30, 369, 255]], [[5, 389, 238], [22, 355, 208]], [[10, 338, 346], [11, 347, 363]], [[7, 300, 388], [59, 294, 401]]], [[41, 44, 9, 22]], [[[[[[[117, 369, 349], [[124, 362, 390], [132, 353, 397], [122, 327, 404]], [[81, 390, 313], [94, 361, 314], [110, 403, 309]], [[[[[87, 3, 90, 407], [107, 378, 414]], [[77, 374, 444], [87, 369, 462]], [[85, 396, 364], [100, 389, 361]], [[38, 357, 433], [37, 329, 410]], [[91, 303, 335], [76, 327, 342], [140, 316, 339]], [[[[[185, 316, 313], [225, 319, 289]], [[190, 271, 268], [211, 267, 282]], [[185, 310, 248], [202, 313, 255]]], [[192, 273, 383], [176, 231, 376]], [[[[[124, 289, 262], [136, 299, 253]], [111, 257, 251], [178, 263, 279], [32, 251, 289]], [[143, 242, 227], [128, 206, 210]]], [[[[[91, 322, 169], [98, 347, 165]], [91, 294, 203], [119, 287, 180]], [46, 323, 170], [[58, 311, 118], [47, 286, 106], [83, 342, 132]], [11, 344, 116]], [[83, 378, 215], [[106, 407, 254], [88, 428, 232], [131, 436, 288]], [126, 264, 122]], [[22, 229, 387], [49, 214, 375]], [[119, 233, 499], [[86, 213, 472], [107, 216, 473]], [74, 190, 441]], [[123, 323, 499], [144, 373, 491], [163, 415, 479], [170, 425, 458]], [133, 285, 449], [183, 306, 434]], [156, 374, 436]], [[[[[[[26, 207, 158], [30, 214, 160], [44, 239, 150], [39, 173, 203], [84, 150, 207], [92, 119, 181], [98, 146, 154]], [22, 226, 87], [21, 251, 69]], [13, 277, 205], [13, 302, 237], [15, 303, 271]], [62, 212, 247], [[89, 225, 45], [106, 185, 8], [[[[[144, 153, 39], [148, 118, 57], [117, 163, 86], [83, 188, 121]], [186, 166, 3], [198, 197, 19]], [156, 84, 37], [62, 140, 3, 5], [62, 150, 31]]], [[[[[[[304, 425, 242], [298, 448, 307], [362, 472, 267], [[246, 361, 250], [236, 340, 265], [252, 404, 244], [185, 37, 9, 247], [228, 384, 191]], [221, 450, 260], [[[[[318, 479, 145], [311, 461, 140], [306, 440, 167], [292, 461, 202]], [389, 498, 188], [320, 396, 114], [380, 364, 94]], [[310, 406, 363], [292, 409, 332], [311, 358, 362], [318, 421, 418], [340, 460, 396], [321, 438, 376]]], [[[[[[[188, 450, 349], [202, 452, 380], [229, 467, 336], [149, 458, 376], [136, 439, 381]], [210, 400, 387], [206, 378, 424], [[238, 353, 369], [243, 354, 3, 38], [226, 321, 387]], [165, 498, 293], [[256, 487, 388], [253, 485, 424], [[227, 478, 454], [202, 487, 437], [284, 456, 461], [270, 450, 443], [166, 461, 457]], [88, 468, 401], [53, 435, 358], [49, 436, 369]], [[458, 447, 200], [447, 472, 222], [441, 426, 259], [450, 411, 284]], [469, 432, 238], [471, 418, 120], [427, 453, 137]], [410, 368, 186], [371, 286, 182], [355, 243, 146], [352, 299, 115]], [418, 300, 149], [4, 6, 337, 145]]], [[[[[439, 358, 364], [423, 338, 355], [456, 328, 334], [493, 353, 381], [498, 326, 387], [475, 363, 420]], [394, 425, 361], [43, 466, 409]], [[[[[492, 317, 308], [489, 322, 304], [487, 286, 315], [465, 336, 257], [462, 378, 272]], [[428, 321, 298], [459, 295, 274], [465, 258, 301]], [[368, 341, 309], [336, 302, 320], [361, 312, 364]], [[359, 398, 283], [342, 398, 262]], [380, 382, 317], [348, 404, 329]], [311, 390, 297], [271, 390, 283], [272, 365, 267]], [316, 346, 314], [319, 340, 331]], [[146, 430, 25], [94, 430, 56], [117, 384, 58], [11, 1, 372, 92]], [[[[[164, 450, 124], [164, 446, 134], [191, 426, 129], [138, 418, 152], [133, 402, 107], [167, 474, 791], [239, 443, 139], [22, 9, 458, 1361], [242, 498, 941], [101, 498, 1451], [72, 407, 114], [152, 409, 1091]], [227, 353, 21, 1256, 406, 141], [[250, 320, 501, 1278, 294, 8
```

```
NetBeans File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Output - Clustering (run)
450, 349], [202, 452, 380]], [229, 467, 336]], [[149, 458, 376]], [136, 439, 381]], [[210, 400, 387]], [206, 378, 424]], [[238, 353, 369]], [243, 354, 3
38]], [226, 321, 387]], [165, 498, 293]], [[256, 487, 388]], [253, 485, 424]], [[227, 478, 454]], [202, 487, 437]], [284, 456, 461]], [270, 450, 443]
], [166, 461, 457]], [[88, 468, 401]], [[53, 435, 358]], [49, 436, 369]], [[458, 447, 200]], [447, 472, 222]], [[441, 426, 259]], [450, 411, 284]]
, [469, 432, 238]], [[471, 408, 120]], [427, 453, 137]], [[410, 368, 186]], [[371, 286, 182]], [[355, 243, 146]], [352, 209, 115]], [[418, 300, 149]], [4
03, 337, 145]]], [[439, 358, 364]], [423, 338, 355]], [456, 328, 334]], [[493, 353, 381]], [498, 326, 387]], [475, 363, 420]], [394, 425, 361],
[433, 466, 409]], [[492, 317, 308]], [489, 322, 304]], [487, 286, 315]], [465, 336, 257]], [462, 378, 272]], [[428, 291, 298]], [459, 295, 274]], [
465, 258, 301]], [[368, 341, 309]], [336, 302, 320]], [361, 312, 364]], [[359, 398, 283]], [342, 398, 262]], [380, 382, 317]], [348, 404, 329]], [
311, 390, 297]], [[271, 390, 283]], [272, 365, 267]], [316, 346, 314]], [319, 340, 331]]], [[146, 430, 25]], [194, 430, 56]], [117, 384, 58]], [11
1, 372, 92]], [[164, 450, 124]], [164, 446, 134]], [191, 426, 129]], [138, 418, 152]], [133, 402, 107]], [167, 474, 79]], [239, 443, 139]], [22
9, 458, 136]], [242, 498, 94]], [101, 498, 145]], [72, 407, 114]], [52, 409, 109]], [227, 353, 2], [256, 406, 14]], [[250, 320, 50]], [278, 294, 8
2]], [278, 345, 84]], [301, 353, 53]], [269, 272, 17]], [262, 225, 18]], [[60, 345, 18]], [109, 326, 20]], [120, 327, 4]], [24, 343, 61]], [356,
390, 19], [363, 342, 28]]]]

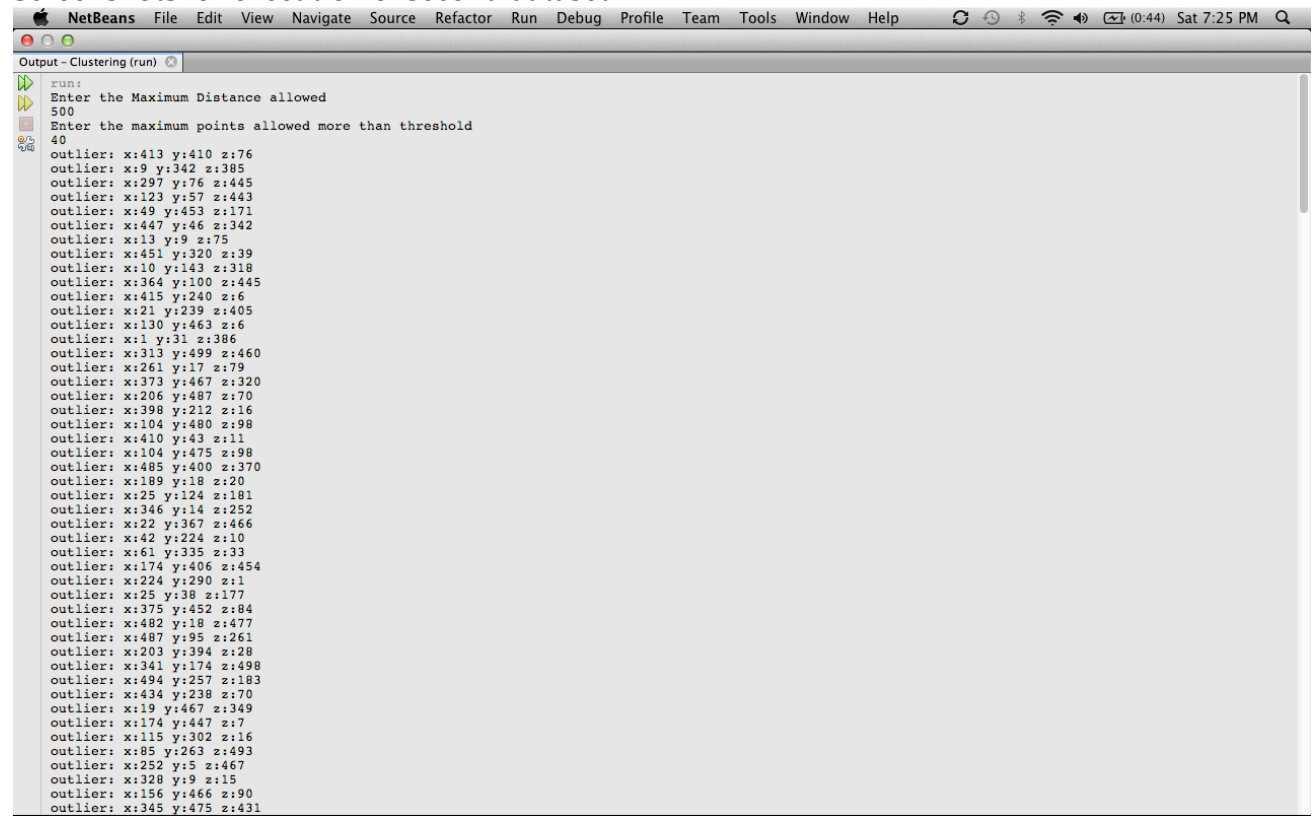
Cluster 2
[[[104, 67, 290]], [109, 94, 238]], [148, 65, 234]], [138, 113, 196]], [161, 114, 191]], [177, 51, 293]], [199, 35, 306]], [195, 40, 342]], [92
, 30, 358]], [24, 73, 214]], [33, 90, 202]], [57, 85, 217]], [193, 128, 264]], [187, 125, 256]], [169, 130, 289]], [136, 193, 316]], [111, 181, 285
]], [65, 167, 332]], [81, 182, 311]], [87, 193, 363]], [89, 202, 382]], [54, 131, 293]], [46, 128, 254]]], [44, 94, 412]], [9, 113, 361]], [94,
12, 120]], [139, 6, 140]], [153, 16, 138]], [134, 25, 160]], [173, 4, 144]], [185, 38, 185]], [162, 49, 176]]]]

Cluster 3
[[[313, 119, 110]], [314, 131, 100]], [288, 134, 68]], [312, 116, 173]], [307, 62, 177]], [328, 69, 165]], [384, 104, 101]], [332, 51, 66]], [
294, 200, 96]], [255, 183, 51]], [243, 161, 58]], [332, 273, 92]], [333, 285, 80]], [322, 314, 142]], [334, 320, 132]], [303, 336, 160]], [370, 25
7, 31]], [250, 60, 34]], [287, 74, 62]], [280, 58, 95]], [256, 124, 20]], [228, 2, 93]], [198, 44, 91]], [203, 57, 68]], [242, 58, 110]], [166, 1
8, 60]], [347, 70, 227]], [371, 80, 181]], [363, 8, 237]], [410, 40, 239]], [439, 14, 223]], [292, 5, 180]], [258, 69, 230]], [269, 67, 245]],
[242, 45, 219]], [287, 75, 273]], [411, 166, 16], [457, 100, 65], [419, 64, 67]], [201, 234, 150]], [229, 191, 196]], [225, 159, 199]], [202
, 144, 207]], [215, 147, 173]], [259, 171, 184]], [284, 211, 214]], [314, 218, 209]], [194, 309, 87]], [207, 344, 60]], [214, 319, 162]], [194, 32
2, 197]], [255, 284, 194]], [289, 310, 206]], [215, 233, 32]], [194, 236, 0]], [161, 218, 52]], [170, 222, 52]], [186, 244, 70]], [180, 135, 1
48]], [180, 102, 175]], [221, 112, 134]], [205, 162, 92]], [463, 253, 171]], [486, 258, 167]], [477, 272, 185]], [462, 241, 225]], [412, 183,
128]], [388, 185, 127]], [436, 167, 132]], [409, 158, 155]], [397, 159, 96]], [387, 179, 78]], [483, 179, 85]], [448, 193, 63]], [462, 318, 94],
441, 294, 114]], [461, 334, 146]], [489, 355, 172]], [497, 346, 162]], [443, 253, 84]], [390, 275, 90]], [385, 261, 122]], [403, 236, 87]], [405, 22
5, 96]], [438, 291, 30]], [463, 248, 27]], [425, 231, 39]]], [429, 158, 234], [400, 169, 248]], [405, 154, 209]], [435, 187, 269]], [449, 18
5, 278]], [388, 123, 224]], [351, 142, 241]], [332, 164, 239]], [482, 140, 169]], [454, 169, 177]], [424, 194, 187]], [490, 108, 144]], [495, 147,
129]], [457, 103, 299]], [473, 53, 295]], [417, 174, 318]], [344, 191, 198]], [342, 191, 261]], [392, 235, 234]], [373, 289, 246]], [387, 263, 252
]], [389, 255, 284]], [369, 267, 323]]]]

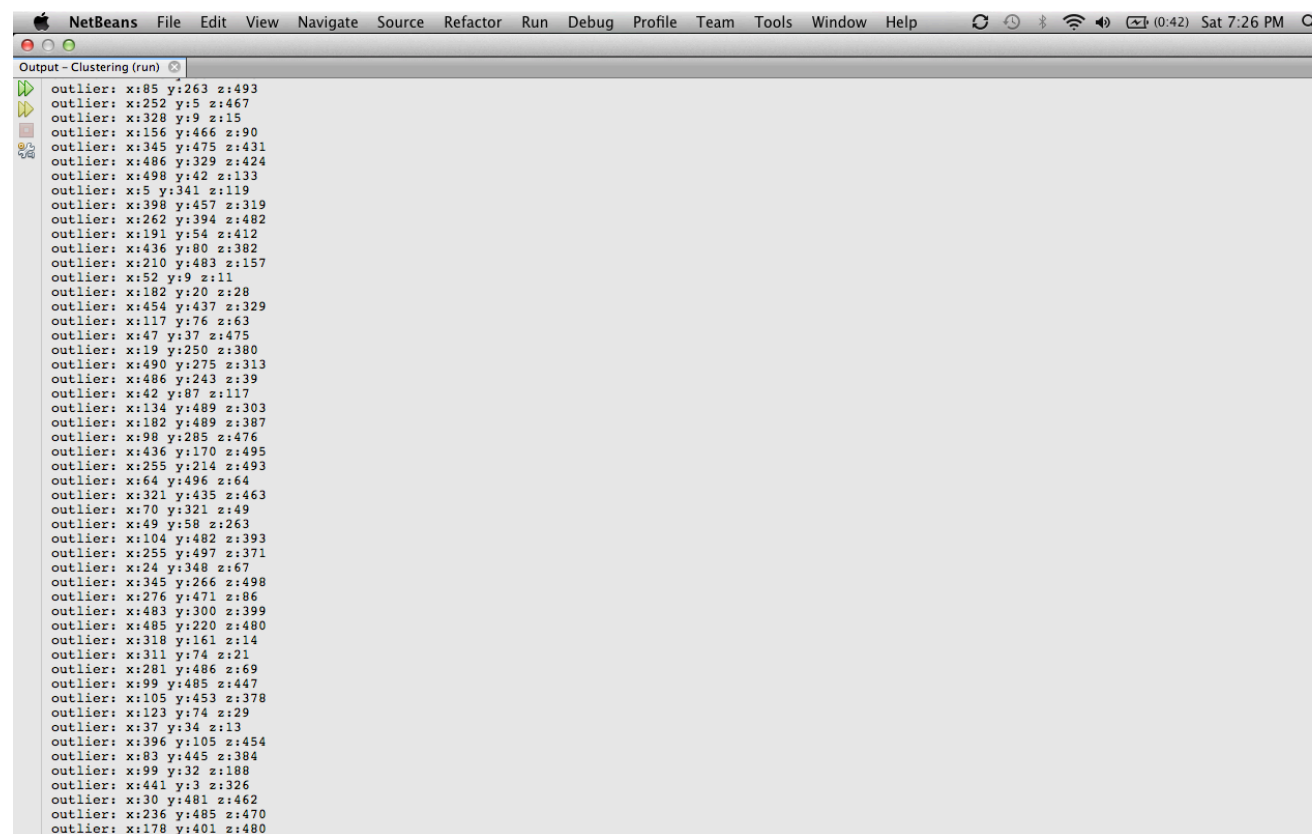
Cluster 4
[[[397, 90, 376]], [391, 89, 401]], [355, 62, 407]], [356, 54, 324]], [342, 48, 279]], [376, 49, 285]], [347, 134, 336]], [337, 156, 314]], [3
18, 150, 367]], [316, 120, 271]], [300, 105, 246]], [316, 106, 308]], [351, 102, 310]], [279, 111, 308]], [468, 123, 405]], [458, 115, 398]], [46
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47, 440]]], [266, 262, 280]]]

BUILD SUCCESSFUL (total time: 35 seconds)
```

Screenshots for execution of second dataset:



```
NetBeans File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Output - Clustering (run)
run:
Enter the Maximum Distance allowed
500
Enter the maximum points allowed more than threshold
40
outlier: x:413 y:410 z:76
outlier: x:9 y:342 z:385
outlier: x:297 y:76 z:445
outlier: x:123 y:57 z:443
outlier: x:49 y:453 z:171
outlier: x:447 y:46 z:342
outlier: x:13 y:9 z:75
outlier: x:451 y:320 z:39
outlier: x:10 y:143 z:318
outlier: x:364 y:100 z:445
outlier: x:415 y:240 z:6
outlier: x:21 y:239 z:405
outlier: x:130 y:463 z:6
outlier: x:1 y:31 z:386
outlier: x:313 y:499 z:460
outlier: x:261 y:17 z:79
outlier: x:373 y:467 z:320
outlier: x:206 y:487 z:70
outlier: x:398 y:212 z:16
outlier: x:104 y:480 z:98
outlier: x:410 y:43 z:11
outlier: x:104 y:475 z:98
outlier: x:485 y:400 z:370
outlier: x:189 y:18 z:20
outlier: x:25 y:124 z:181
outlier: x:346 y:14 z:252
outlier: x:22 y:367 z:466
outlier: x:42 y:224 z:10
outlier: x:61 y:335 z:33
outlier: x:174 y:406 z:454
outlier: x:224 y:290 z:1
outlier: x:25 y:38 z:177
outlier: x:375 y:452 z:84
outlier: x:482 y:18 z:477
outlier: x:487 y:95 z:261
outlier: x:203 y:394 z:28
outlier: x:341 y:174 z:498
outlier: x:494 y:257 z:183
outlier: x:434 y:238 z:70
outlier: x:19 y:467 z:349
outlier: x:174 y:447 z:7
outlier: x:115 y:302 z:16
outlier: x:85 y:263 z:493
outlier: x:252 y:5 z:467
outlier: x:328 y:9 z:15
outlier: x:156 y:466 z:90
outlier: x:345 y:475 z:431
```



```
NetBeans File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Output - Clustering (run)
outlier: x:85 y:263 z:493
outlier: x:252 y:5 z:467
outlier: x:328 y:9 z:15
outlier: x:156 y:466 z:90
outlier: x:345 y:475 z:431
outlier: x:486 y:329 z:424
outlier: x:498 y:42 z:133
outlier: x:5 y:341 z:119
outlier: x:398 y:457 z:319
outlier: x:262 y:394 z:482
outlier: x:191 y:54 z:412
outlier: x:436 y:80 z:382
outlier: x:210 y:483 z:157
outlier: x:52 y:9 z:11
outlier: x:182 y:20 z:28
outlier: x:454 y:437 z:329
outlier: x:117 y:76 z:63
outlier: x:47 y:37 z:475
outlier: x:19 y:250 z:380
outlier: x:490 y:275 z:313
outlier: x:486 y:243 z:39
outlier: x:42 y:87 z:117
outlier: x:134 y:489 z:303
outlier: x:182 y:489 z:387
outlier: x:98 y:285 z:476
outlier: x:436 y:170 z:495
outlier: x:255 y:214 z:493
outlier: x:64 y:496 z:64
outlier: x:321 y:435 z:463
outlier: x:70 y:321 z:49
outlier: x:49 y:58 z:263
outlier: x:104 y:482 z:393
outlier: x:255 y:497 z:371
outlier: x:24 y:348 z:67
outlier: x:345 y:266 z:498
outlier: x:276 y:471 z:86
outlier: x:483 y:300 z:399
outlier: x:485 y:220 z:480
outlier: x:318 y:161 z:14
outlier: x:311 y:74 z:21
outlier: x:281 y:486 z:69
outlier: x:99 y:485 z:447
outlier: x:105 y:453 z:378
outlier: x:123 y:74 z:29
outlier: x:37 y:34 z:13
outlier: x:396 y:105 z:454
outlier: x:83 y:445 z:384
outlier: x:99 y:32 z:188
outlier: x:441 y:3 z:326
outlier: x:30 y:481 z:462
outlier: x:236 y:485 z:470
outlier: x:178 y:401 z:480
```

```
NetBeans File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Output - Clustering (run)
outlier: x:30 y:481 z:462
outlier: x:236 y:485 z:470
outlier: x:178 y:401 z:480
outlier: x:367 y:458 z:445
outlier: x:485 y:459 z:16
outlier: x:79 y:169 z:130
outlier: x:447 y:388 z:142
outlier: x:452 y:282 z:471
outlier: x:124 y:433 z:9
outlier: x:423 y:161 z:426
outlier: x:475 y:485 z:431
outlier: x:467 y:255 z:435
outlier: x:143 y:132 z:32
outlier: x:55 y:45 z:24
outlier: x:177 y:452 z:490
outlier: x:75 y:308 z:471
outlier: x:451 y:257 z:474
outlier: x:118 y:387 z:439
outlier: x:26 y:268 z:14
outlier: x:105 y:31 z:429
outlier: x:123 y:24 z:438
outlier: x:359 y:428 z:10
outlier: x:496 y:378 z:252
outlier: x:36 y:415 z:289
outlier: x:8 y:126 z:252
outlier: x:405 y:215 z:473
outlier: x:492 y:128 z:277
outlier: x:430 y:12 z:295
outlier: x:51 y:29 z:408
outlier: x:487 y:399 z:51
outlier: x:108 y:396 z:431
outlier: x:49 y:48 z:410
outlier: x:440 y:368 z:80
outlier: x:13 y:157 z:8
outlier: x:441 y:475 z:302
outlier: x:97 y:142 z:460
outlier: x:245 y:493 z:471
outlier: x:49 y:78 z:145
outlier: x:96 y:374 z:89
outlier: x:133 y:465 z:84
outlier: x:25 y:316 z:117
outlier: x:469 y:138 z:195
outlier: x:52 y:147 z:34
outlier: x:147 y:442 z:60
outlier: x:46 y:486 z:417
outlier: x:464 y:253 z:58
outlier: x:438 y:74 z:413
outlier: x:225 y:399 z:465
outlier: x:489 y:92 z:456
outlier: x:372 y:474 z:276
outlier: x:391 y:55 z:485
outlier: x:379 y:428 z:20
```

```
NetBeans File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help
Output - Clustering (run)
outlier: x:71 y:89 z:123
outlier: x:352 y:30 z:352
outlier: x:395 y:456 z:493
outlier: x:397 y:181 z:61
outlier: x:16 y:306 z:362
outlier: x:160 y:496 z:389
outlier: x:130 y:445 z:45
outlier: x:457 y:65 z:239
outlier: x:494 y:30 z:179
outlier: x:42 y:444 z:22
outlier: x:427 y:68 z:376
outlier: x:423 y:71 z:406
outlier: x:496 y:488 z:350
outlier: x:41 y:117 z:10
outlier: x:366 y:442 z:372
outlier: x:20 y:88 z:395
outlier: x:261 y:100 z:485
outlier: x:367 y:15 z:146
outlier: x:136 y:2 z:397
outlier: x:462 y:181 z:422
outlier: x:430 y:237 z:483
outlier: x:483 y:482 z:207
outlier: x:457 y:87 z:31
outlier: x:440 y:66 z:124
outlier: x:25 y:22 z:368
outlier: x:337 y:481 z:233
outlier: x:51 y:4 z:366
outlier: x:478 y:81 z:25
outlier: x:408 y:398 z:430
outlier: x:40 y:395 z:41
outlier: x:448 y:349 z:60
outlier: x:427 y:481 z:246
outlier: x:196 y:6 z:140
outlier: x:34 y:211 z:482
outlier: x:346 y:7 z:310
outlier: x:470 y:115 z:34
outlier: x:62 y:372 z:35
outlier: x:300 y:412 z:19
outlier: x:105 y:406 z:408
outlier: x:128 y:478 z:437
outlier: x:192 y:18 z:416
outlier: x:4 y:377 z:454
outlier: x:120 y:2 z:32
outlier: x:436 y:469 z:9
Enter Number of clusters
3
Cluster 1
[[[[[[[[[160, 242, 239], [[[[[[[102, 202, 272], [100, 188, 266]], [115, 224, 259]], [75, 212, 290], [74, 235, 290]], [66, 195, 259]], [92, 252, 295]]],
[[[191, 330, 255], [174, 337, 293], [192, 331, 310]], [235, 340, 273]], [[166, 347, 206], [178, 323, 169]], [[[[[235, 277, 257], [219, 284, 238]]],
[[229, 227, 249], [245, 218, 203]]], [[276, 260, 218], [260, 287, 175]]], [[215, 276, 318], [196, 293, 311]], [237, 246, 298]]]], [[[[[[[222, 175, 18
3], [243, 142, 147]], [[185, 143, 156], [[171, 111, 116], [[156, 127, 83], [136, 131, 89]]]], [[215, 157, 241], [228, 148, 210]], [[274, 176, 236], [3
```


[illegible]

Screenshots for execution of third dataset:

[illegible]

```
NetBeans File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help (0:33) Sat 7:36 PM

Output - Clustering (run)

- [64], [104, 93, 51], [63, 84, 76]], [63, 106, 101], [[[[[52, 80, 131], [[56, 55, 133], [66, 49, 148]], [58, 32, 134]]], [68, 69, 109]], [27, 88, 96]], [47, 97, 190]]], [[[[[80, 162, 61], [54, 173, 51], [97, 145, 86]], [[71, 218, 60], [103, 209, 291]]], [[158, 124, 18], [172, 86, 23], [198, 84, 38]]]], [31, 3, 76]], [[[[[79, 286, 9], [60, 271, 21]], [41, 243, 101], [[[[[108, 295, 64], [120, 252, 72]], [128, 277, 27], [142, 282, 54]]], [118, 328, 110]]], [[[[[126, 343, 14], [121, 361, 41]], [[75, 364, 28], [46, 356, 35]], [63, 379, 56]]], [140, 398, 71]]], [[[[[311, 457, 33], [276, 433, 61]], [318, 420, 96]], [323, 478, 94], [380, 476, 89]]], [[[[232, 498, 45], [238, 491, 13]], [[207, 458, 26], [195, 450, 91], [232, 434, 21]]], [456, 485, 29], [420, 461, 175]], [[242, 384, 148], [240, 398, 112], [258, 397, 88]]], [[315, 403, 165], [310, 407, 206]], [330, 453, 177], [326, 465, 158]]], [[220, 431, 131], [242, 417, 135]], [239, 495, 133]], [172, 455, 178], [161, 425, 173]], [[[[[189, 407, 58], [210, 420, 51]], [176, 399, 107]]], [9, 353, 73], [172, 352, 129]]], [121, 384, 97]]], [129, 345, 85], [302, 332, 56], [291, 315, 38], [279, 311, 55]]], [304, 266, 56], [334, 325, 18, 111], [[[[[324, 285, 211], [315, 305, 270], [310, 313, 271]]], [[383, 244, 220], [411, 239, 261]], [339, 234, 175], [[379, 207, 160], [367, 221, 168, 111], [358, 181, 141]]]], [[[[261, 252, 135], [260, 222, 133], [244, 229, 131]]], [228, 278, 100], [242, 322, 74], [210, 322, 34], [202, 342, 21]]]], [[271, 305, 174], [259, 333, 208]], [235, 270, 177]]], [394, 370, 196]]]]]

Cluster 2
[[[[[491, 340, 483], [477, 357, 433]], [415, 388, 476], [426, 374, 430]], [441, 487, 485], [385, 477, 461]]], [[[[[[[[[309, 399, 348], [294, 429, 352], [274, 347, 372]]], [350, 370, 375], [346, 352, 352]]], [306, 393, 291], [[328, 419, 256], [3348, 422, 218], [339, 406, 228]], [373, 441, 195], [11], [339, 372, 254]]]], [[252, 359, 311], [226, 356, 317]], [250, 315, 371], [266, 263, 402]]], [328, 466, 386], [346, 491, 362]]], [[[[280, 455, 2, 92], [277, 463, 261]], [312, 446, 317], [234, 451, 298]], [229, 458, 349], [201, 447, 329]], [177, 457, 401]]], [[[[242, 389, 427], [222, 351, 423, 1], [222, 341, 392]]], [275, 426, 430], [310, 417, 396]]], [[294, 376, 480], [293, 368, 496]], [279, 356, 483]], [300, 422, 474], [295, 457, 484]]], [169, 382, 474]]], [[[[[395, 346, 305], [387, 376, 304]], [401, 360, 277]], [415, 391, 269]], [442, 299, 278], [408, 317, 233], [406, 290, 188]]], [[471, 474, 260], [480, 270, 280]], [449, 229, 275]]], [[28, 322, 337], [309, 346, 339]], [311, 295, 342]], [301, 324, 310]], [325, 267, 321]]], [[490, 357, 303], [452, 315, 353], [373, 306, 359]], [497, 287, 333]]], [[[[[340, 219, 404], [351, 220, 424]], [391, 204, 384], [389, 189, 402]]], [296, 172, 409], [276, 205, 365], [244, 175, 391]]], [[375, 185, 484], [395, 234, 480], [434, 120, 495], [[423, 92, 434], [465, 90, 430]], [41, 119, 398], [408, 104, 378], [403, 145, 379]]], [365, 117, 452]]], [[[[362, 313, 414], [342, 299, 394]], [356, 301, 456], [384, 263, 365]], [31, 0, 299, 468]]], [[[[463, 226, 395], [438, 182, 434], [436, 182, 428]], [406, 163, 458]], [482, 229, 334]], [[486, 164, 390], [480, 176, 405], [440, 184, 355], [442, 179, 390]]]], [[[[482, 444, 235], [481, 433, 262]], [497, 431, 196], [486, 266, 176]], [453, 438, 202]], [[426, 484, 274], [396, 457, 298], [415, 455, 301]], [393, 478, 285]], [387, 485, 239], [369, 499, 306]]], [[[[[[[[[60, 364, 397], [448, 325, 409], [47, 316, 439], [12, 336, 407]]], [88, 373, 364]], [197, 318, 395], [103, 283, 382], [91, 273, 413]]], [120, 334, 466], [34, 353, 451]], [36, 318, 478]]], [[132, 353, 355], [121, 377, 353]], [128, 352, 314], [131, 347, 309]]], [[178, 380, 350], [177, 408, 323]], [202, 390, 388]]], [[88, 415, 459], [[114, 4, 63, 437], [115, 485, 437]], [142, 444, 474], [110, 479, 488]]], [25, 399, 477]], [[118, 283, 342], [47, 282, 361], [1, 270, 415]]], [[[[78, 456, 305], [79, 439, 318]], [70, 460, 280]], [59, 485, 259], [135, 476, 305]], [[79, 451, 375], [75, 438, 379]], [92, 428, 361]], [48, 426, 391]]], [[[[47, 377, 271], [65, 361, 269], [71, 345, 276]]], [21, 357, 259]], [103, 374, 287]], [[447, 321, 297], [56, 347, 299]], [24, 336, 317]], [42, 286, 310]], [[26, 375, 332], [40, 365, 335]], [31, 387, 371]]], [[44, 491, 477], [75, 464, 471], [96, 469, 457]]], [[4, 471, 478], [19, 460, 441]]], [[[[165, 258, 324], [168, 294, 317]], [197, 248, 279], [174, 222, 284]], [180, 271, 257]], [187, 267, 280, 401], [187, 261, 398], [203, 248, 396]]], [159, 282, 407]], [[141, 273, 446], [137, 311, 427], [132, 324, 415]], [108, 279, 487]]], [[[[[86, 186, 334], [92, 179, 328]], [80, 225, 342]], [[138, 160, 347], [129, 136, 350]], [145, 197, 328]]], [[71, 130, 391], [66, 125, 404]], [115, 144, 420], [117, 109, 404], [131, 80, 387]]], [[109, 217, 
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