Expectation of demand value and material cost through the fuzzy C-mean clustering techniques

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Abstract- Clustering is one of the fundamental regions in information mining writing. There are a few approaches accessible in the writing to cluster a document. Right now, strategy is proposed to create cluster center contingent upon given data. This paper presents Fuzzy C-mean clustering on the given data of information into the participation grade utilized for clustering. The information of RCF Kapurthala Punjab for year 2017-2018 has been taken for clustering. The information is separated into one third information to discover three distinctive cluster centers.

Keywords*: Clustering, fuzzy sets and fuzzy C-mean clustering*

Introduction: Fuzzy alludes to things which are not clear or inconclusive. Fuzzy logic takes after the human choice. It manages the inconclusive data. Fuzzy logic was presented by Lofti A. Zadeh in his exploration paper "fuzzy sets" (1965). He is considered as the father of fuzzy logic. In data structure study, clustering analysis is an important element of exploratory data analysis. It is simply study of internal structure of complex data set, which cannot be deal through simple method. Clustering is one of the most fundamental issues in variety of fields such as pattern recognition, image processing, data mining. Clustering is the process of organizing objects into groups whose members are similar in some way. It helps in searching for structures in data. Clustering is one of the fundamental issues in pattern recognition, in which a large number of samples are converted into small number of representative prototypes or clusters (Klir & Yuan, 2003). Clustering is simply used to classify into category according to their similarity, therefore a cluster is a collection of objects, which are ‘similar’ between them and are ‘dissimilar’ to the objects belonging to other clusters (Mehdizadeh, Sadi-Nezhad, & Tavakkoli-Moghddam, 2008).Clustering algorithms can be classified into the following categories:-

Hierarchical clustering algorithm- It is based on the union between the two nearest clusters. After a few iterations it reaches the final clusters wanted. Partition-based clustering algorithm-It just masterminds set of articles into disjoint bunch where the quantity of the subsequent groups is predefined by the client. Density-based clustering algorithm-It has assumed a significant job in discovering non direct shapes structure based on the density. Grid-based clustering algorithm-It assists with dealing with various formed bunches in multi-density situations. Model-based clustering algorithm-As there are some drawback in various leveled clustering algorithms for to a great extent heuristic and not based on formal models, Model-based clustering algorithm is another option. K-means clustering algorithm-It is one of the most straightforward unaided learning algorithms. It basically follows east approach to order a given informational collection through a specific number of bunches. The fundamental thought is to characterize k focuses one for each cluster.Among all above algorithm, segment based algorithm is generally contemplated in which we parcel the item as needs be to their likeness with some membership function. Here 'membership function' is utilized to discover fuzziness of certain information. As it were we can say membership function speaks to the level of truth in fuzzy logic. Moreover parcel based clustering algorithm can sort into probabilistic and fuzzy clustering algorithms. Clustering algorithms can be applied in many fields, such as: Promoting discovering gatherings of clients with comparable conduct given a huge database of client information containing their properties and past purchasing records. Biology-order of plants and creatures as indicated by their attributes and features. Libraries-masterminding books as indicated by their stream. Insurance: recognizing gatherings of engine protection arrangement holders with a high normal case cost; distinguishing frauds. City-arranging: distinguishing gatherings of houses as per their home kind, esteem and geological location. Earthquake considers: grouping watched seismic tremor focal points to recognize perilous zones. Fuzzy c-mean (FCM) algorithm is a sort of clustering algorithm which is broadly applied in different fields such as machine learning, medical imaging, target recognition, picture division. This technique was created by Dunn (1973)

and further improved by Bezdek in (1981). FCM is a system for clustering which allows one lot of information to have a place with at least two clusters. It depends on minimization of the given objective function. The FCM algorithm is based on the distance between the classification center and the information point, by allocating membership to each information guide corresponding to each cluster center. More information is available in the cluster center's proximity to the cluster center. Moreover, the summation of each information point membership should be equal to one. FCM clustering algorithm gives best outcome for covered informational index and gives preferable outcomes over k-means clustering algorithm. Unlike k-means algorithm where information point should exclusively have a place with one cluster center where in FCM clustering algorithm, information point is allotted membership to each cluster because of which information point may have a place with more than one cluster center.

2. Literature Review

Clustering has a long and rich history in information structure and in an assortment of scientific fields. With the existence of Fuzzy c-mean clustering algorithm there are numerous researchers who have done a great deal of research in numerous fields.J. C. Bezdek (1981) proposed a strategy for pattern recognition with fuzzy objective function algorithm in which he consider a few fuzzy algorithm that effect segment of highlight space, empowering classification of unlabeled perception, in view of the decision functions which characterize the classifier.J.C. Bezdek et al. (1984) clarified FORTRAN-IV coding of FCM clustering program. FCM program is applicable to a wide assortment of geostatistical information examination problems.J.C. Bezdek et al. (1986) states the aftereffects of a statistical comparison of two forms of the FCM clustering algorithms. They propose and embody a rough fuzzy c-means execution dependent on replacing the necessary variates in FCM condition with whole number esteemed estimates.Mohammad et al. (1998) proposed a methology of fuzzy logic displaying as a generic apparatus for demonstrating of complex systems.Belacel et al. (2002) propose another local search heuristic, called Fuzzy J-Means, where the area is characterized by every single imaginable centroid to-pattern relocations.Lin Zhu et al. (2009) clarify another term Generalized FCM clustering algorithm with improved fuzzy partition.K.Sathiyakumari et al. (2011) clarify the unaided approach for document

clustering utilizing altered fuzzy c-mean algorithm.Qiang Niu and Xinjian Huang (2011) exhibited an approach to manage the issue of untimely convergence of the FCM clustering algorithm dependent on particle swarm optimization, which is delicate to commotion and less operative when taking care of the informational collection with enormous measurements than the quantity of sample.Deguang et al. (2012) chips away at the application of FCM clustering algorithm dependent on particle swarm optimization in computer forensics. As the genuine information, investigation is difficult to get the ideal outcomes hence FCM clustering algorithm dependent on particle swarm optimization in computer forensics gives progressively satisfactory results.Xiaojun et al. (2012) proposed enhanced FCM clustering algorithm, in which a distance administrative factor is proposed to correct the comparability estimation. The factor depends on cluster thickness, which speaks to the worldwide dispersion data of focuses in a cluster. It is then applied to the conventional FCM for distance correction.Aseel et al. (2016) disclose a strategy to create clusters relying upon transient data. The proposed work advantage information mining in different areas such as data recovery, healthcare and numerous others.Esmaeil Mehdizadeh and Amir Golabzaei (2016) proposed another heuristic fuzzy clustering algorithm dependent on electrical standards. The electrical FCM algorithm utilize the electrical standards in electric fields and coulomb's law to acquire the better and the realest apportioning, having most extreme detachment of clusters.Hua-Xin Pei et al., (ITQM 2017) proprose a novel thickness based FCM(D-FCM) by introducing thickness of given example. The thickness tops are utilized to locate the quantity of clusters and the underlying participation network automatically.

3. Methodology

Fuzzy C-Mean Clustering

Fuzzy clustering is a mathematical technique in which experimental data sets are classified according to similarities[16]. FCM is the clustering approach that permits the inclusion of one set of data in two or more clusters. Dunn developed this method in 1973 and Bezdak enhanced it in 1981 and also frequently used to recognize a pattern.

Due to the fact the data set y_k is clustered to N clusters by FCM algorithm . Clustering is centers c_j and τ_{jk}^m partitioning by minimizing the cost function.

$$min\ z_{fcm} = \sum_{k=1}^{N}\sum_{j=1}^{c} \tau_{jk}^m \left\|y_k - c_j\right\|^2 \qquad (3.1)$$

Where τ_{jk}^m shows the membership grade of y_k to the n^{th} clusters, $\|\,.\,\|$ is the Euclidean distance and c_j is the c^{th} cluster centers. The $m > 1$ fuzzification parameter governs the softness of the membership. In higher mask estimation capability for m=2 was recognized. Therefore in this effort the fuzzificationor is the set to (3.2) until a suitable terminate standard is not met.

$$c_j = \frac{\sum_{k=1}^{n} \tau_{jk}^m y_{jk}}{\sum_{k=1}^{n} \tau_{jk}^m} \qquad c \in N \qquad (3.2)$$

$$\tau_{jk}^m = \begin{cases} \left[\sum_{i=1}^{c} \left(\frac{\|y_k - c_j\|}{\|y_k - c_i\|} \right)^{\frac{2}{r-1}} \right]^{-1} & \text{if } \|y_k - c\| > 0\,, \forall\, j \\ 1 & if\ \|y_k - c\| = 0 \\ 0 & if\ \exists\ i \neq j \quad \left\|y_k - c_j\right\| = 0 \end{cases} \qquad (3.3)$$

The calculation is based on such steps:

- The cluster center is initialized. Calculate the distance to the centers from each data set. The equation (3.1) and (3.2) uses Euclidean distance.
- The sum for all points of membership grade is equal to 1 and the membership grade shall be determined by each point from each center.
- The new centers for each cluster were calculated based on the estimated membership grade (3.3).
- Emphasize these means until the contrast between z_{fcm} , c_j, or τ_{jk} from the prior stage and existing stage under $\in$. $\in$ is alluded as the controller of fluffiness, which varies in cases, it could be an instinctive modest number or an earlier .

4. Data Identification

Following datasets are used in this study which includes cost of material used in manufacturing one train coach. Here data of Chair car AC coach is used. We have applied FCM algorithm on this data in MATLAB.

In this study we will take cost and demand value of all the required things to build a single coach. All this data is taken from Rail Coach Factory Kapurthala, Punjab for year 2017-2018 for ELEC Section and all classes for LWCZDAC. The description and specification of all the require things for a coach are tabulated in table 1. Where LHB= Linke Hoffmann Bush, AC= Air conditioner, NAC= Non Air conditioner, Elast= Elastic, Cu=copper, Cond=conductor.

Table1. demand value and cost of materials

S.No.	Description & specification	Demand Value (x)	Cost/Coach (y)
1.	Emergency Battery Charger	3,12,830.40	45,000
2.	Feeder junction box for LHB EOG AC/NAC coaches with bio toilet	11,02,53,235.33	58,500.00
3.	$(4 \times 4 \times 1)c + 2 \times 0.75$ black outer sheath with white numbered cores multicore electron beam irradiaated cable	26,412.88	40,730
4.	1.5 sq. mm (black)	5,083.89	6,918.00

5.	1.5 sq. mm (blue)	902.72	6,918
6.	1.5 sq. mm (chocolate)	15,656.55	14,309
7.	1.5 sq. mm (red)	14,309	10,958
8.	1.5 sq. mm (white)	12,891.97	11,187
9.	1.5 sq. mm (yellow)	5,134.22	4,383
10.	1.5 sq.mm colour (green/yellow)	4,898.10	4,898.10
11.	120 sq.mm (black)	43,890.70	33,075
12.	16 sq.mm (green/yellow)	16,140.80	621
13.	185 sq.mm (blue)	15,33,243.00	1,04,704
14.	185 sq.mm (red)	15,33,243.00	1,04,704
15.	185 sq.mm (yellow)	13,48,990.50	1,04,704
16.	18 × 1.5 sq.mm black outer sheath white numbered cores electron beam irradiated multicore cable	26,26,471.58	19,456
17.	25 sq.mm (black) 750v to 1.8/3.0 kv	11,816.40	11,991
18.	25 sq.mm (black) 750v	19,743.66	10,158
19.	25 sq.mm (blue)	11,816.40	11,991
20.	25 sq.mm (red) 750v to 1.8/3.0 kv	11,816.40	11,991
21.	25 sq.mm (red) 750v.	19,743.66	10,158
22.	25 sq.mm (yellow) 750v to 1.8/3.0 kv.	11,816.40	11,991
23.	25 sq.mm (yellow) 750v	19,743.66	10,158
24.	25 sq.mm colour (blue)	19,743.66	10,158
25.	25 × 1.5 sq.mm (black)	41,80,318.26	29,722
26.	4 sq.mm (blue)	2,152.08	6,896
27.	4 sq.mm (black)	13,49,049.31	5,853.00
28.	4 sq.mm (chocolate)	4,185	3,658
29.	4 sq.mm (green/yellow)	722.52	1,829
30.	4 sq.mm (yellow)	2,152.08	4,170
31.	4 sq.mm (red)	2,152.08	7,622

32.	4 × 1.5 sq.mm (black)	94,103.30	21,289
33.	50 sq.mm (black) 750v to 1.8/3.0 kv	6,262.96	8,918
34.	50 sq.mm (black) 750v	12,105.66	25,200
35.	50 sq.mm (blue) 750v to 1.8/3.0 kv	6,262.96	8,918
36.	50 sq.mm (blue) 750v	10,248.00	25,200
37.	50 sq.mm (chocolate)	1,124.56	6,300
38.	50 sq.mm (green/yellow)	2,026.53	1
39.	50 sq.mm (red) 750v to 1.8/3.0 kv	6,262.96	8,918.00
40.	50 sq.mm (red) 750v	12,105.66	25,200
42.	50 sq.mm (yellow) 750v to 1.8/3.0 kv	7,401.68	8,918
43.	50 sq.mm (yellow) 750v	10,248.00	25,200
44.	60kva transformer 750v/415v 3 phase 4 wire	32,77,329.00	2,71,235
45.	70 sq.mm (green/yellow) 750v to 1.8/3.0 kv	27,361.28	2,604
46.	70ah,110v, vrla monoblock lead acid maintenance free set with 9mdls of 12v each precharged battery	4,05,631.45	81,126
47.	Cable binder	373.80	1,203
48.	Cable binder(3.6 × 200)	138.00	276
49.	Cable jacket system	2,067.78	2,444
50.	Cable jacket system	10,34,993.93	4,303
51.	Cable jacket system	4,875.00	4,874
52.	Cable marking system for LHB type coaches	7,139.00	1,428
53.	Copper crimping socket for 25sq.mm cable	558.60	319
54.	Copper crimping socket for 25sq.mm E beam cable	1,25,789.32	32
55.	Copper crimping socket for 50sq.mm cable	941.10	431
56.	Copper crimping socket for 50sq.mm cable	861.00	431
57.	Copper crimping socket for 70 sq.mm cable	733.44	185
58.	Double inlet centrifugal blower assembly complete with mounting brackets	91,07,968.00	21,504
59.	Emergency lighting system for eog type LHB coaches	71,125.00	26,432
60.	End fitting pg21,annx a,tab a2,s.no.5	17,50,502.00	6,273
61.	Ext supp socket 125 amp,415v,ip67,5pole(3p+n+e) with pilot contacts,rcf annx a. For external supply socket	17,950.00	3,802
62.	F.R.L.T. low tension cot.insul.tape 0.3mm green col.roll length of 10mt	385.86	655
63.	F.R.L.T. (red)	257.24	655
64.	F.R.L.T. (black)	392.94	655
65.	F.R.L.T.(blue)	392.94	655

66.	F.R.L.T.(yellow)	392.94	655
67.	Fixing clip 72mm dia	13,440.00	1,849
68.	Flat connecting(with wago connecttrs)as per list no edml014	3,88,000.00	4851
69.	Hexagonal lock nut pg thread brass pg21 with ,annx a,tab a12,s.no.6	45,697.60	287
70.	Hexagonal lock nut pg thread brass pg48 ,annx a,tab a10,s.no.8	598.40	30
71.	High capacity intervehical coupler (z s coupling) 500 a ,750v for LHB EOG AC coaches without polyamide conduit	10,24,38,648.00	211200
72.	Jumper cable with connector	1,82,000.00	22255
73.	Led light fitting for lavatory/mirror area	13,945.90	10597
74.	Led light fitting for LHB non AC chair car type coaches	72,06,060.00	79897
75.	Led light fitting for passanger alarm chain indication light	34,20,160.00	2,980
76.	Led light fitting for passanger area (cabin) for LHB AC type coaches	1,32,58,939.00	5,599
77.	Led light fitting for toilet indication in LHB ac coaches	30,76,322.00	4,087
78.	Led light fitting(doorway/gangway area) for LHB eog type coaches	3,04,962.00	17,640
79.	Pa system for double decker eog coaches	6,80,010.00	37,100
80.	Polymide flexible conduit of pg-29,annxa,table-a1,s.no-5	20,125.00	28,185
81.	Polymide flexible conduit of pg36,annx a,tab-a1,s.no.6	1,04,104.44	9,120
82.	Polymide flexible conduit pg-16, annxa, table- a-1,s.No-3.	4,600.00	14,700
83.	Polymide flexible conduit pg21.annx.a,tab.a1,s.no4.	1,23,085.13	14,159
84.	Polymide flexible conduit to pg11, annx.a,tab-a1,s.no-2.	994.00	12,288
85.	PVC spout type circular box fire retardent,20mm 4way dia 20mm,w/o cover & w/o mounting holes.	3,81,981.00	551
86.	Rigid pvc conduit fire retardant dia 40mm,grey colour isi marks	309.33	1,263
87.	Rmpu for double decker eog type chair car coaches	2,10,40,296.00	21,05,596
88.	Self-priming monoblock pump assly. With controller	1,01,850.00	20,378
89.	Set of clamp for LHB generator car	2,783.80	586
90.	Switch board cabinet for double decker EOG type coaches	1,47,25,000.00	7,75,000
91.	Switch socket combined 5pin (6amp/250v AC),along with 1a glass fuse, fitted with powder coated steel plate & cover frame	1,84,992.00	10,662
92.	Tube clamp to pg11,annx a,tab a8,s.no.2	18,021.00	47
93.	Wifi based entertainment system,pi system & integration of pa system in double decker coaches	1,44,09,600.00	7,37,500
94.	Wire rope assembly	5,220.00	1,274

We have taken fuzziness index m=2 and initial membership grade as

S.No.	A	B	C
1.	1	0	0
2.	1	0	0
3.	1	0	0
4.	1	0	0
5.	1	0	0
6.	1	0	0
7.	0.99	0.01	0
8.	1	0	0
9.	0.99	0	0.1
10.	1	0	0
11.	0.01	0.99	0
12.	0	1	0
13.	0	1	0
14.	0.005	0.99	0.005
15.	0.01	0.99	0
16.	0	1	0
17.	0	1	0
18.	0	1	0
19.	0	1	0
20.	0	0.99	0.01
21.	0.005	0.005	0.99
22.	0	1	1
23.	0	0	1
24.	0.005	0.005	0.99
25.	0	0.01	0.99
26.	0	0	1
27.	0	0	1
28.	0	0.01	0.99
29.	0	0	1
30.	0	0	1
31.	1	0	0
32.	1	0	0
33.	1	0	0
34.	1	0	0
35.	1	0	0
36.	1	0	0
37.	0.99	0.01	0
38.	1	0	0
39.	0.99	0	0.1
40.	1	0	0
41.	0.01	0.99	0
42.	0	1	0
43.	0	1	0
44.	0.005	0.99	0.005
45.	0.01	0.99	0
46.	0	1	0
47.	0	1	0
48.	0	1	0
49.	0	1	0
50.	0	0.99	0.01
51.	0.005	0.005	0.99
52.	0	1	1
53.	0	0	1
54.	0.005	0.005	0.99
55.	0	0.01	0.99
56.	0	0	1
57.	0	0	1

58.	0	0.01	0.99
59.	0	0	1
60.	0	0	1
61.	1	0	0
62.	1	0	0
63.	1	0	0
64.	1	0	0
65.	1	0	0
66.	1	0	0
67.	0.99	0.01	0
68.	1	0	0
69.	0.99	0	0.1
70.	1	0	0
71.	0.01	0.99	0
72.	0	1	0
73.	0	1	0
74.	0.005	0.99	0.005
75.	0.01	0.99	0
76.	0	1	0
77.	0	1	0
78.	0	1	0
79.	0	1	0
80.	0	0.99	0.01
81.	0.005	0.005	0.99
82.	0	1	1
83.	0	0	1
84.	0.005	0.005	0.99
85.	0	0.01	0.99
86.	0	0	1
87.	0	0	1
88.	0	0.01	0.99
89.	0	0	1
90.	0	0	1
91.	1	0	0
92.	1	0	0
93.	1	0	0
94.	1	0	0

Table2. Assignment of Initial membership grade

5.Experimental Result

On calculating membership grade through FCM clustering following membership grade are obtained:-

S.No.	A1	B1	C1
1.	0.142741	0.085559	0.7717
2.	0.335184	0.341517	0.323299
3.	0.164855	0.10237	0.732775
4.	0.166555	0.103678	0.729767
5.	0.166845	0.103908	0.729247
6.	0.165767	0.103063	0.73117
7.	0.165884	0.103152	0.730964
8.	0.165982	0.103229	0.73079
9.	0.16657	0.103687	0.729744
10.	0.166582	0.103697	0.729721
11.	0.163657	0.101421	0.734922
12.	0.165831	0.103097	0.731072
13.	0.012059	0.005702	0.982238
14.	0.012059	0.005702	0.982238
15.	0.0309	0.015348	0.953752
16.	0.345341	0.094563	0.560096

17.	0.166051	0.103285	0.730664
18.	0.165509	0.102855	0.731636
19.	0.166051	0.103285	0.730664
20.	0.166051	0.103285	0.730664
21.	0.165509	0.102855	0.731636
22.	0.166051	0.103285	0.730664
23.	0.165509	0.102855	0.731636
24.	0.165509	0.102855	0.731636
25.	0.552295	0.427127	0.020578
26.	0.166759	0.103839	0.729402
27.	0.032488	0.016127	0.951385
28.	0.166641	0.103742	0.729617
29.	0.166894	0.103941	0.729165
30.	0.166778	0.103851	0.729371
31.	0.166753	0.103836	0.729411
32.	0.160098	0.098632	0.74127
33.	0.166459	0.103604	0.729937
34.	0.165946	0.103216	0.730838
35.	0.166459	0.103604	0.729937
36.	0.166076	0.103318	0.730606
37.	0.166834	0.103898	0.729268
38.	0.166817	0.103878	0.729305
39.	0.166459	0.103604	0.729937
40.	0.165946	0.103216	0.730838
41.	0.166834	0.103898	0.729268
42.	0.16638	0.103541	0.730079
43.	0.166076	0.103318	0.730606
44.	0.814485	0.096636	0.088879
45.	0.165029	0.102467	0.732504
46.	0.134531	0.079636	0.785833
47.	0.166923	0.103963	0.729114
48.	0.166946	0.10398	0.729074
49.	0.166796	0.103864	0.72934
50.	0.069369	0.036948	0.893683
51.	0.166584	0.103699	0.729717
52.	0.166452	0.10359	0.729958
53.	0.166917	0.103957	0.729127
54.	0.157911	0.096918	0.745171
55.	0.166889	0.103935	0.729175
56.	0.166895	0.10394	0.729165
57.	0.166905	0.103948	0.729147
58.	0.328655	0.493652	0.177693
59.	0.16174	0.099915	0.738345
60.	0.002636	0.001164	0.9962
61.	0.165681	0.102982	0.731337
62.	0.166926	0.103965	0.729109
63.	0.166935	0.103972	0.729093
64.	0.166926	0.103964	0.72911
65.	0.166926	0.103964	0.72911
66.	0.166926	0.103964	0.72911
67.	0.16601	0.103241	0.730749
68.	0.136626	0.081063	0.782311
69.	0.163749	0.101457	0.734793
70.	0.166916	0.103956	0.729128
71.	0.335319	0.342165	0.322516
72.	0.153459	0.093539	0.753002

73.	0.165912	0.103173	0.730915
74.	0.297125	0.580138	0.122737
75.	0.921073	0.048977	0.029949
76.	0.340583	0.424233	0.235183
77.	0.717131	0.110285	0.172584
78.	0.143604	0.086164	0.770232
79.	0.108427	0.061581	0.829993
80.	0.165367	0.102761	0.731872
81.	0.159449	0.098116	0.742436
82.	0.166535	0.103671	0.729794
83.	0.158002	0.097004	0.744995
84.	0.166802	0.103879	0.729319
85.	0.137198	0.081471	0.781332
86.	0.166927	0.103966	0.729107
87.	0.340728	0.382771	0.276501
88.	0.159534	0.098194	0.742272
89.	0.16676	0.103833	0.729406
90.	0.341171	0.411793	0.247036
91.	0.153316	0.093417	0.753266
92.	0.165704	0.102996	0.7313
93.	0.341087	0.414114	0.244799
94.	0.166586	0.103696	0.729717

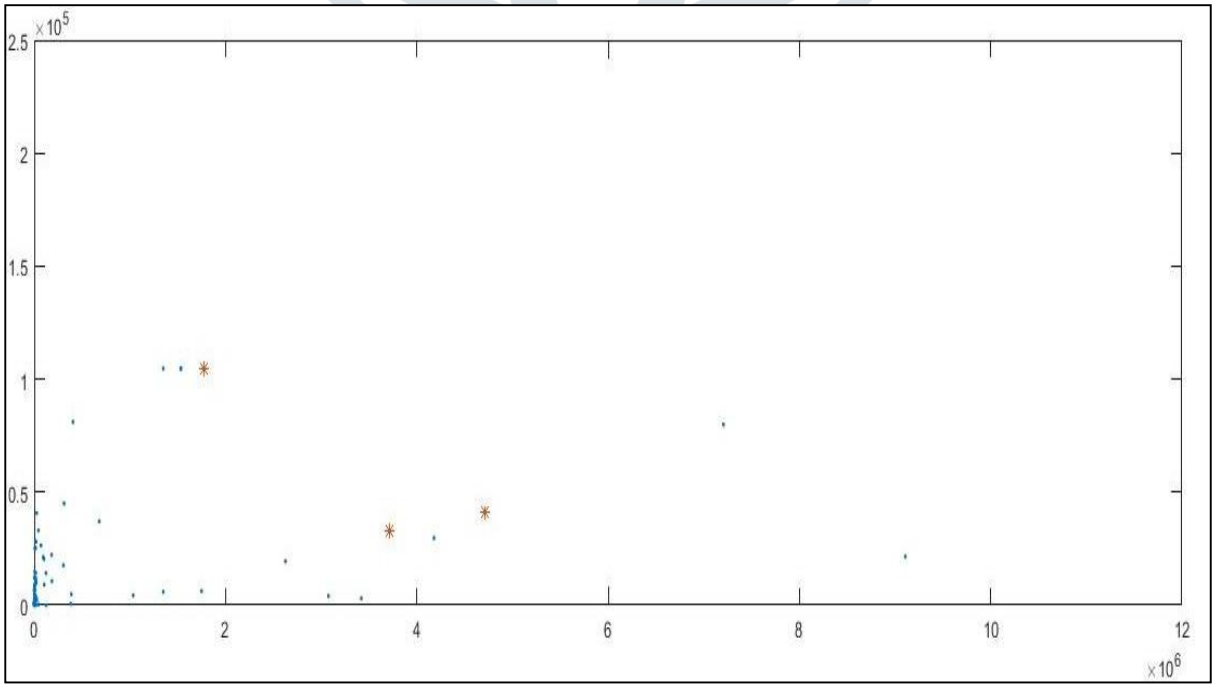
Table3. Calculated membership grade

As already mention we have taken whole data into three parts and find three different cluster centres. On applying FCM clustering algorithm on data we have calculated cluster centres as follow:-

New cluster centre are:-

New cluster centre	X	Y
v1	3715861	32594.32
v2	4708352	40971.94
v3	1775215	104319.7

Table 4. Obtained cluster centre



Graph 1shows the cluster centres. In which x axis represent demand value and y axis represent cost value in INR.

6.Conclusion

In this paper we have used FCM clustering algorithm in finding cluster centre of the RCF kapurthala data. Data consist of demand and cost value in INR. We have divide data into three different clusters after that we have found three different cluster centres. The three clusters are (3715861, 32594.32), (4708352, 40971.94), (1775215, 104319.7) which are significantly away from the desired location. It is occurring due to variation of (110253235.33, 58500), (102438648, 211200) which are significantly far away from the desired location.

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