

Foundations of Machine Learning (CS564)

Assignment No.2: Parametric DBSCAN & Agglomerative-Hierarchical Clustering

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Chapter 1: Student Dataset

Introduction

The Student Dataset is a multivariate dataset, and is used as a toy-dataset for this unsupervised learning assignment. This dataset consists of details about 15000 students.

It is referred to as multivariate, because the dataset has 40 features documented for each of the 15000 students/data-points.

So, in conclusion, each of these 15000 data-points can be represented as points in a 40-dimensional space. Of course, since this is a toy data set, some unclean portions of the dataset like null values or duplicated values need be removed during the data cleaning and exploratory data analysis activities.

So, as part of this assignment, using the Unsupervised Learning Algorithms DBSCAN & Agglomerative Hierarchical Clustering, we have to:

- a.) Perform data-cleaning & exploratory data-analysis on the raw dataset.
- b.) Remove null elements and duplicated rows from the dataset.
- c.) Setting up feature-selection criteria for clustering purpose.
- d.) Feature-Selection
- e.) Analyze the different combinations of the selected features and explore naturally existing groupings (or Clusters) existing within the dataset.
- f.) Display the different clusters in graphical (Scatter) plots using different colors, and also analyze the validity of the found clusters using intrinsic (Average Silhouette Coefficient). Since the Student Dataset is not a labeled dataset, ground truth in the form of class-labels is not available with us. Hence, we cannot evaluate the extrinsic cluster validity indices like Rand Index, Shannon's Entropy, and Jaccard Coefficient etc.

How to Plot 4-dimesnional feature points on a 2-dimensional Scatter plot?

If we do not wish to use principal component analysis (or, PCA) to reduce the dimensionality of the input data, we can use the below mentioned rudimentary technique:

- a.) Making the Scatter Plot with any combination of only two out of the n (out of 40) available (or, selected) features. So, using this technique, we can have a total of C_2^n (or, $\frac{n(n-1)}{2}$) possible plots.

Data-Cleaning & Exploratory Data-Analysis:

STEP 1:

Drop Duplicate Rows with all Features still intact.

STEP 2:

Drop Columns with huge sums of Null/NA data.

```

url
= 'https://raw.githubusercontent.com/SaumyenMishraIITP/iris/main/students.csv'
student_db = pd.read_csv(url)

#print (student_db)
student_db = student_db.drop_duplicates()
#student_db.isnull().sum()
student_db = student_db.drop(['gender'], axis = 1)
student_db = student_db.drop(['age'], axis = 1)
#print (duplicates)
student_db.isnull().sum()

tot_students = len(student_db.index)
tot_features = len(student_db.columns)

```

Feature-Selection Criteria & Feature-Selection:

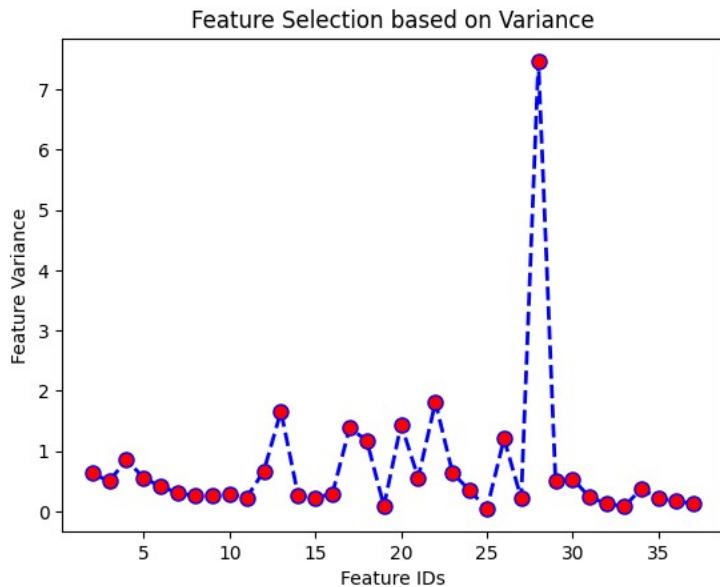
First of all since there are 38 features (2 of the features were already dropped because of having huge number of null / D.N.A points) in the student database, we first have to reduce the dimensionality i.e. choose between 5-10 features amongst all available (as we have been asked to select 5-10 features for clustering the Student database) features to take into the clustering algorithms.

Then, looking at the labels on the columns in the given dataset, we will choose a set of most interpretable features from the set of 38 features. This is a subjective activity and might differ from person to person depending upon their definition/comprehension of “Interpretability” in the given student dataset.

For this exercise the set of most interpretable features as per my understanding are the set of extra-curricular activities indulged by the students. Amongst the sports activities also, only ball-based sports are chosen for this case.

So, **Most_Interpretable_Features =**

```
{ "basketball", "football", "soccer", "softball", "volleyball", "baseball", "tennis", "dance", "band", "music"}
```



Now, we have taken all the data-points under the above mentioned columns and calculated their variance individually. Variance is the measure of how reliable is the mean of the given data-points, in terms of being a better representative of that feature amongst all students. So, the Plot of Variance of Features Vs feature IDs is given here.

Since we want reliable data to be given as arguments to our clustering algorithm, we will choose only those features which have variance score < 1.

So, **Set(Features_with_variance < 1) =**

```
{"basketball", "football", "soccer", "softball", "volleyball", "baseball", "tennis"}
```

Now, for our clustering algorithms, the set of features will be an intersection of both the above sets, i.e.

Cluster_features = (Most_Interpretable_Features) \cap (Features_with_variance < 1) OR,

Cluster_features = {"basketball", "football", "soccer", "softball", "volleyball", "baseball", "tennis"}

```
list_var = []
Y1=[]

for a1 in range (0,tot_features,1) :
    Y1=[]
    Y1.append(student_db.iloc[:,[a1]].values)
    v1=np.var(Y1)
    list_var.append(v1)

list_var.remove(list_var[0])
list_var.remove(list_var[0])

print(f"\nVariance List : \n{list_var}\n")

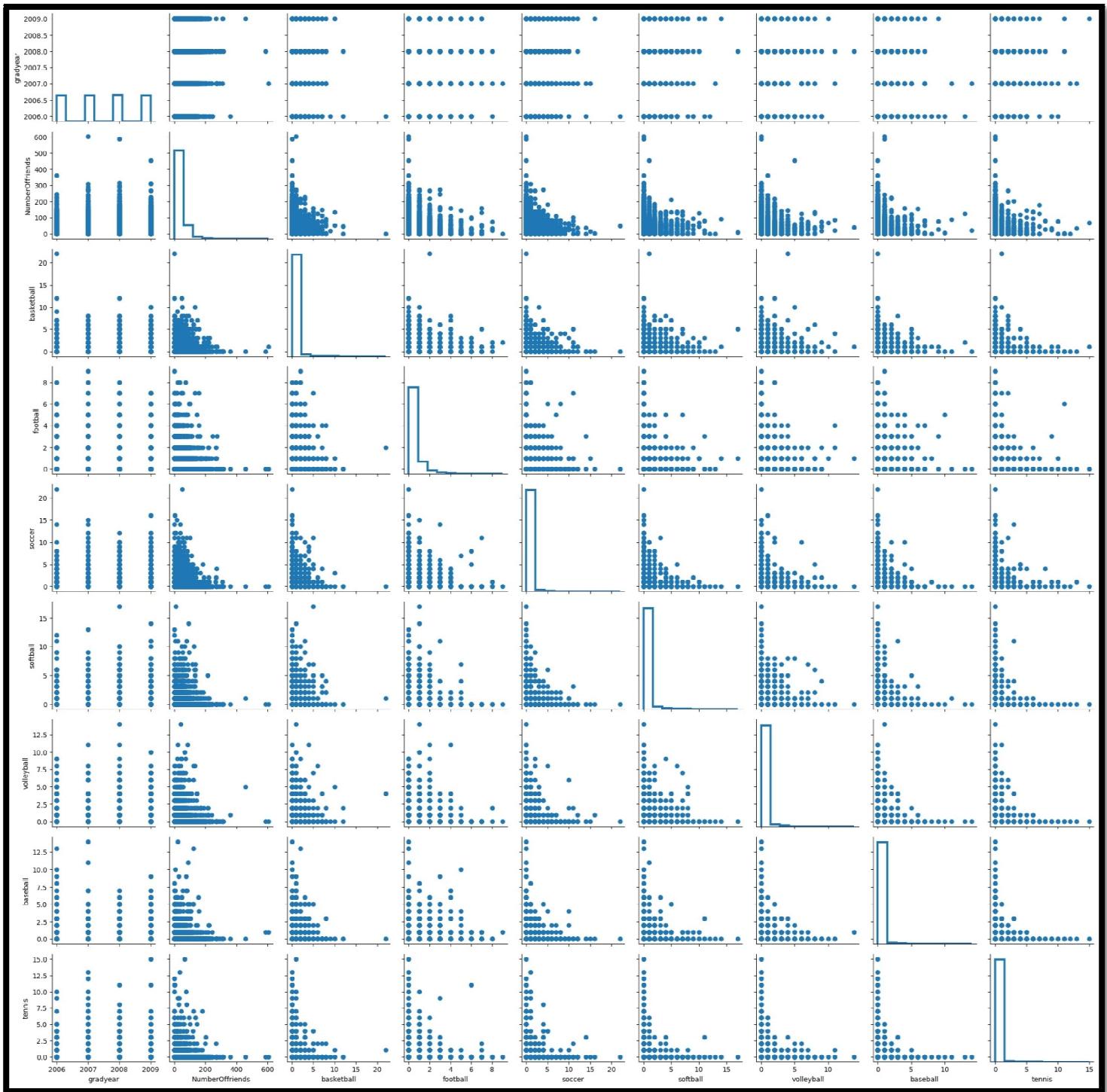
feat=[]
for a3 in range (2, tot_features, 1) :
    feat.append(a3)

plt.plot(feat,list_var,color='blue', linestyle='dashed', linewidth = 2,
marker='o', markerfacecolor='red', markersize=8)
plt.xlabel('Feature IDs')
plt.ylabel('Feature Variance')
plt.title('Feature Selection based on Variance')
plt.show()
```

Pre-Clustering Data-Analysis using Seaborn Pairgrid maps:

```
g =
sns.PairGrid(student_db.loc[:,["gradyear", "NumberOfffriends", "basketball", "football", "soccer", "softball", "volleyball", "baseball", "tennis"]])
#g =
sns.PairGrid(student_db.loc[:,["gradyear", "NumberOfffriends", "Gender", "dance", "music", "god", "blonde"]])
#"step", which means the histogram will be drawn as a line plot.
g.map_diag(plt.hist, histtype="step", linewidth=3) # Diagonal subplots represent the
distribution of each individual variable.
g.map_offdiag(plt.scatter) #Off-diagonal subplots represent the relationship between pairs of
variables.

delay=0
while delay<2000 :
    delay=delay+1
```



Chapter 2: DBSCAN Clustering Algorithm

DBSCAN stands for Density based Spatial clustering for applications with noise. It is an unsupervised learning clustering algorithm which finds naturally existing groupings within multivariate data-points based on the concepts of density reachability & density connectivity.

So, DBSCAN finds clusters in the dataset which are basically collections of densely packed data-points (at least $minpts$ no. of points in an ϵ neighborhood) well separated from each other.

Hence, one major advantage of the DBSCAN Algorithm is that here, we do not need to pass the No.s of clusters as a parameter into the algorithm itself. So, DBSCAN is not only able to detect and remove outliers from the given dataset, it's also able to detect any spatially oblong/concave/convex connected structures within the p-dimensional input dataset.

The two parameters taken by DBSCAN Algorithm are: $\epsilon = 0.5$, $minpts=5$, as it has been specified in the assignment itself.

Now, we have done the DBSCAN Clustering of datasets two times in this assignment:

- a.) Once taking the Selected Features from Chapter 1, and all the data-points in the student dataset.
 - b.) Then, taking the Selected Features from Chapter 1, but only the data-points in the student dataset corresponding to Graduation year “2007” or “Batch of 2007”.

Python Code:

```
*****  
*****  
*****  
*****  
*****  
#*****  
*****  
*****  
*****  
*****  
  
#print(tot_students)  
  
list_gradyear = student_db.iloc[:,[0]].values  
list_num_of_friends = student_db.iloc[:,[1]].values  
  
unique_gradyears = student_db.gradyear.unique()      #[2007 2006 2008 2009]  
tot_unique_gradyears = len(unique_gradyears)        #4  
  
*****  
*****  
*****  
*****  
*****  
#*****  
*****  
*****  
*****  
*****  
  
data_for_clustering_whole_batch = student_db.iloc[:,[2,3,4,5,6,9,10]].values  
data_for_clustering_2007_batch = []
```



```

print(f"\n\nTotal Number of Clusters for 2007 batch found with DBSCAN are :"
{count_1-1} (Excluding 1 Cluster for Outliers)\n\n")

X1=[]
for j1 in range(0, count_1, 1) :
    X1.append(0)

for labels_2 in CLUSTERS_2 :
    for k1 in range (0, count_1, 1) :
        if labels_2 == cluster_2_unique_lables[k1] :
            X1[k1] = X1[k1] + 1
        break

tot1=0
for p1 in range (0, len(X1), 1) :
    print(f"\nNumber of Points corresponding to cluster label
'{cluster_2_unique_lables[p1]}' are : {X1[p1]}\n")
    tot1=tot1+X1[p1]

if tot1==tot_points_2 :
    print("\nALL POINTS HAVE BEEN SUCCESSFULLY PARTITIONED FOR 2007 BATCH\n")
else :
    print("\nPlease count properly\n")

*****
*****
*****
*****
*****
```

```

z= len(data_for_clustering_2007_batch)
A1=[]
A2=[]
A3=[]
A4=[]
A5=[]
A6=[]
A7=[]

for u in range(0, z, 1) :
    A1.append(data_for_clustering_2007_batch[u][0])
    A2.append(data_for_clustering_2007_batch[u][1])
    A3.append(data_for_clustering_2007_batch[u][2])
    A4.append(data_for_clustering_2007_batch[u][3])
    A5.append(data_for_clustering_2007_batch[u][4])
    A6.append(data_for_clustering_2007_batch[u][5])
    A7.append(data_for_clustering_2007_batch[u][6])

plt.scatter(friends_2007, A1 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected for Basketball Team')
plt.title('Social Circle vs Basketball Team selections in Batch of 2007')
```

```

plt.show()

plt.scatter(friends_2007, A2 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected for Football Team')
plt.title('Social Circle vs Football Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A3 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected for Soccer Team')
plt.title('Social Circle vs Soccer Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A4 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Softball Team')
plt.title('Social Circle vs Softball Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A5 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Volleyball Team')
plt.title('Social Circle vs Volleyball Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A6 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Baseball Team')
plt.title('Social Circle vs Baseball Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A7 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Tennis Team')
plt.title('Social Circle vs Tennis Team selections in Batch of 2007')
plt.show()

```

Outputs & Scatter-Plots:

For entire student dataset:

Total no. points considered for clustering the Whole Batch of Students is : 14734

Total Number of Clusters found for the complete batch with DBSCAN are : 132
(Excluding 1 Cluster for Outliers)

Number of Points corresponding to cluster label '0' are : 8252

Number of Points corresponding to cluster label '1' are : 327

Number of Points corresponding to cluster label '2' are : 166

Number of Points corresponding to cluster label '3' are : 26

Number of Points corresponding to cluster label '4' are : 9

Number of Points corresponding to cluster label '5' are : 201

Number of Points corresponding to cluster label '6' are : 27

Number of Points corresponding to cluster label '7' are : 14

Number of Points corresponding to cluster label '8' are : 165

Number of Points corresponding to cluster label '9' are : 537

Number of Points corresponding to cluster label '10' are : 129

Number of Points corresponding to cluster label '11' are : 53

Number of Points corresponding to cluster label '12' are : 16

Number of Points corresponding to cluster label '13' are : 230

Number of Points corresponding to cluster label '14' are : 26

Number of Points corresponding to cluster label '15' are : 709

Number of Points corresponding to cluster label '16' are : 155

Number of Points corresponding to cluster label '17' are : 18

Number of Points corresponding to cluster label '18' are : 20

Number of Points corresponding to cluster label '19' are : 25

Number of Points corresponding to cluster label '20' are : 63

Number of Points corresponding to cluster label '21' are : 174

Number of Points corresponding to cluster label '22' are : 36

Number of Points corresponding to cluster label '23' are : 55

Number of Points corresponding to cluster label '24' are : 26

Number of Points corresponding to cluster label '25' are : 26

Number of Points corresponding to cluster label '26' are : 60

Number of Points corresponding to cluster label '27' are : 7

Number of Points corresponding to cluster label '28' are : 13

Number of Points corresponding to cluster label '29' are : 14

Number of Points corresponding to cluster label '30' are : 9

Number of Points corresponding to cluster label '31' are : 46

Number of Points corresponding to cluster label '32' are : 261

Number of Points corresponding to cluster label '33' are : 13

Number of Points corresponding to cluster label '34' are : 21

Number of Points corresponding to cluster label '35' are : 60

Number of Points corresponding to cluster label '36' are : 66

Number of Points corresponding to cluster label '37' are : 84

Number of Points corresponding to cluster label '38' are : 56

Number of Points corresponding to cluster label '39' are : 6

Number of Points corresponding to cluster label '40' are : 11

Number of Points corresponding to cluster label '41' are : 48

Number of Points corresponding to cluster label '42' are : 16

Number of Points corresponding to cluster label '43' are : 84

Number of Points corresponding to cluster label '44' are : 46

Number of Points corresponding to cluster label '45' are : 16

Number of Points corresponding to cluster label '46' are : 28

Number of Points corresponding to cluster label '47' are : 24

Number of Points corresponding to cluster label '48' are : 14

Number of Points corresponding to cluster label '49' are : 6

Number of Points corresponding to cluster label '50' are : 24

Number of Points corresponding to cluster label '51' are : 7

Number of Points corresponding to cluster label '52' are : 5

Number of Points corresponding to cluster label '53' are : 8

Number of Points corresponding to cluster label '54' are : 25

Number of Points corresponding to cluster label '55' are : 73

Number of Points corresponding to cluster label '56' are : 5

Number of Points corresponding to cluster label '57' are : 11

Number of Points corresponding to cluster label '58' are : 7

Number of Points corresponding to cluster label '59' are : 11

Number of Points corresponding to cluster label '60' are : 14

Number of Points corresponding to cluster label '61' are : 10

Number of Points corresponding to cluster label '62' are : 42

Number of Points corresponding to cluster label '63' are : 26

Number of Points corresponding to cluster label '64' are : 34

Number of Points corresponding to cluster label '65' are : 30

Number of Points corresponding to cluster label '66' are : 13

Number of Points corresponding to cluster label '67' are : 5

Number of Points corresponding to cluster label '68' are : 11

Number of Points corresponding to cluster label '69' are : 7

Number of Points corresponding to cluster label '70' are : 5

Number of Points corresponding to cluster label '71' are : 15

Number of Points corresponding to cluster label '72' are : 5

Number of Points corresponding to cluster label '73' are : 7

Number of Points corresponding to cluster label '74' are : 15

Number of Points corresponding to cluster label '75' are : 14

Number of Points corresponding to cluster label '76' are : 35

Number of Points corresponding to cluster label '77' are : 10

Number of Points corresponding to cluster label '78' are : 14

Number of Points corresponding to cluster label '79' are : 13

Number of Points corresponding to cluster label '80' are : 7

Number of Points corresponding to cluster label '81' are : 10

Number of Points corresponding to cluster label '82' are : 10

Number of Points corresponding to cluster label '83' are : 6

Number of Points corresponding to cluster label '84' are : 11

Number of Points corresponding to cluster label '85' are : 5

Number of Points corresponding to cluster label '86' are : 7

Number of Points corresponding to cluster label '87' are : 17

Number of Points corresponding to cluster label '88' are : 21

Number of Points corresponding to cluster label '89' are : 9

Number of Points corresponding to cluster label '90' are : 6

Number of Points corresponding to cluster label '91' are : 8

Number of Points corresponding to cluster label '92' are : 5

Number of Points corresponding to cluster label '93' are : 16

Number of Points corresponding to cluster label '94' are : 18

Number of Points corresponding to cluster label '95' are : 23

Number of Points corresponding to cluster label '96' are : 11

Number of Points corresponding to cluster label '97' are : 5

Number of Points corresponding to cluster label '98' are : 6

Number of Points corresponding to cluster label '99' are : 8

Number of Points corresponding to cluster label '100' are : 18

Number of Points corresponding to cluster label '101' are : 15

Number of Points corresponding to cluster label '102' are : 5

Number of Points corresponding to cluster label '103' are : 5

Number of Points corresponding to cluster label '104' are : 6

Number of Points corresponding to cluster label '105' are : 8

Number of Points corresponding to cluster label '106' are : 6

Number of Points corresponding to cluster label '107' are : 6

Number of Points corresponding to cluster label '108' are : 5

Number of Points corresponding to cluster label '109' are : 5

Number of Points corresponding to cluster label '110' are : 9

Number of Points corresponding to cluster label '111' are : 11

Number of Points corresponding to cluster label '112' are : 6

Number of Points corresponding to cluster label '113' are : 5

Number of Points corresponding to cluster label '114' are : 10

Number of Points corresponding to cluster label '115' are : 6

Number of Points corresponding to cluster label '116' are : 6

Number of Points corresponding to cluster label '117' are : 6

Number of Points corresponding to cluster label '118' are : 12

Number of Points corresponding to cluster label '119' are : 5

Number of Points corresponding to cluster label '120' are : 5

Number of Points corresponding to cluster label '121' are : 10

Number of Points corresponding to cluster label '122' are : 7

Number of Points corresponding to cluster label '123' are : 5

Number of Points corresponding to cluster label '124' are : 6

Number of Points corresponding to cluster label '125' are : 8

Number of Points corresponding to cluster label '126' are : 6

Number of Points corresponding to cluster label '127' are : 7

Number of Points corresponding to cluster label '128' are : 5

Number of Points corresponding to cluster label '129' are : 9

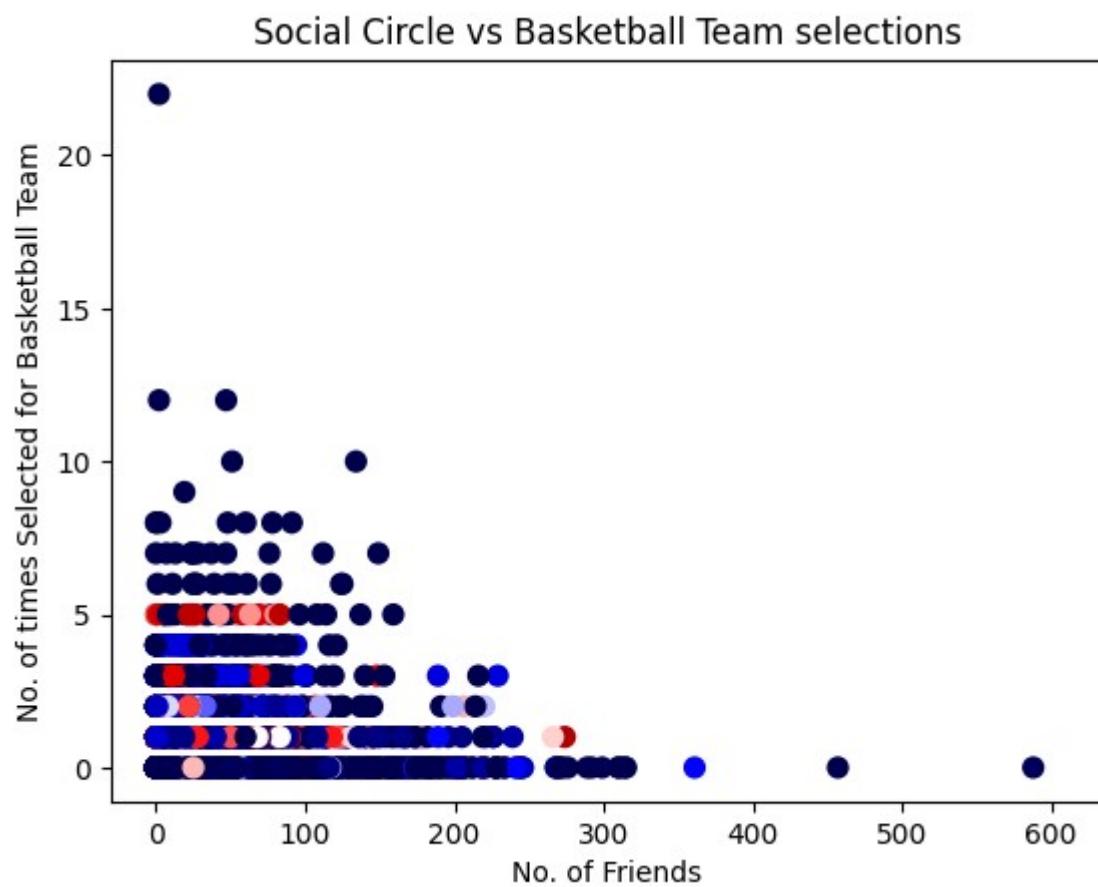
Number of Points corresponding to cluster label '130' are : 8

Number of Points corresponding to cluster label '131' are : 9

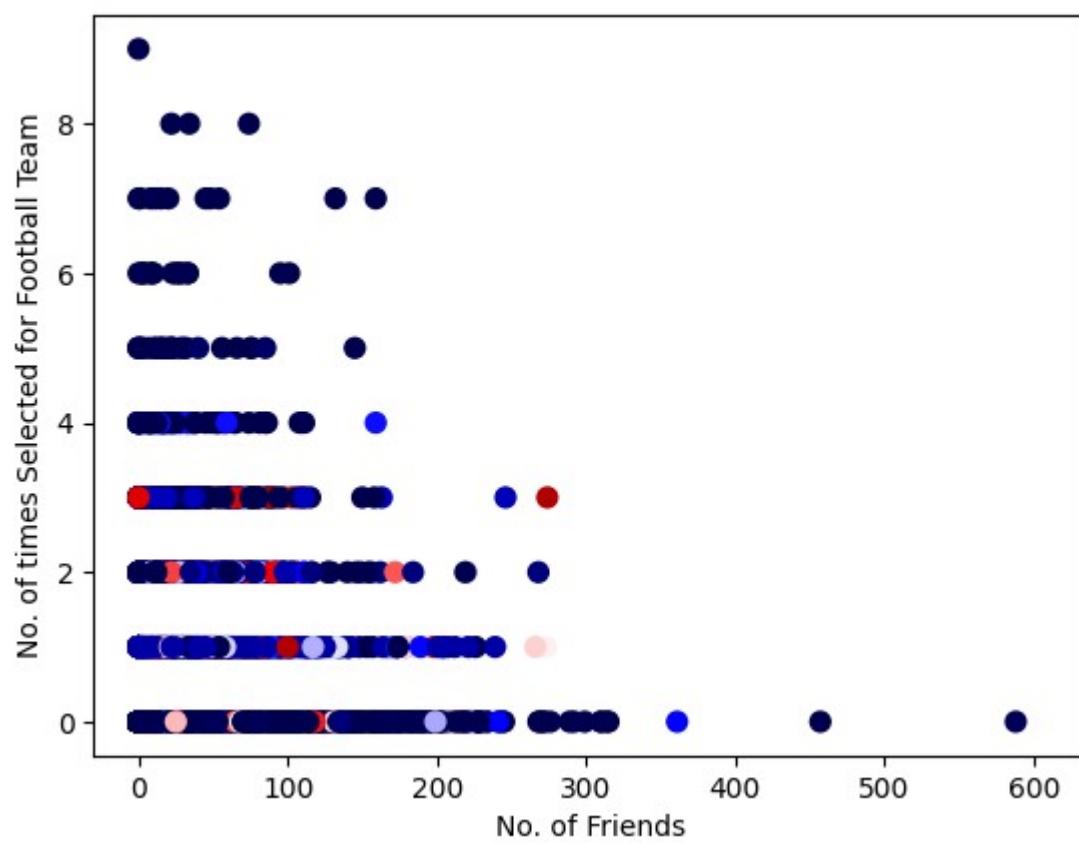
Number of Points corresponding to cluster label '-1' are : 1290

ALL POINTS HAVE BEEN SUCCESSFULLY PARTITIONED FOR THE COMPLETE BATCH

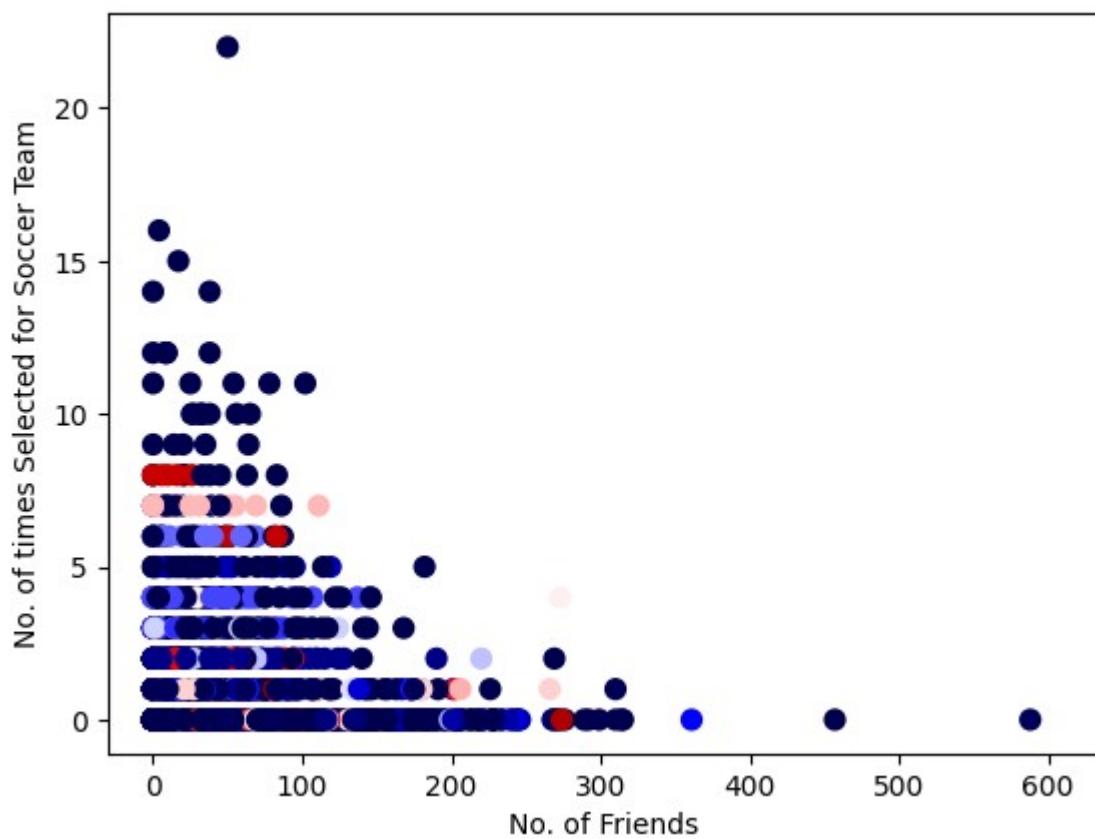
Silhouette score of the complete partitioning done for Whole Batch of Students is : 0.8517860733978807



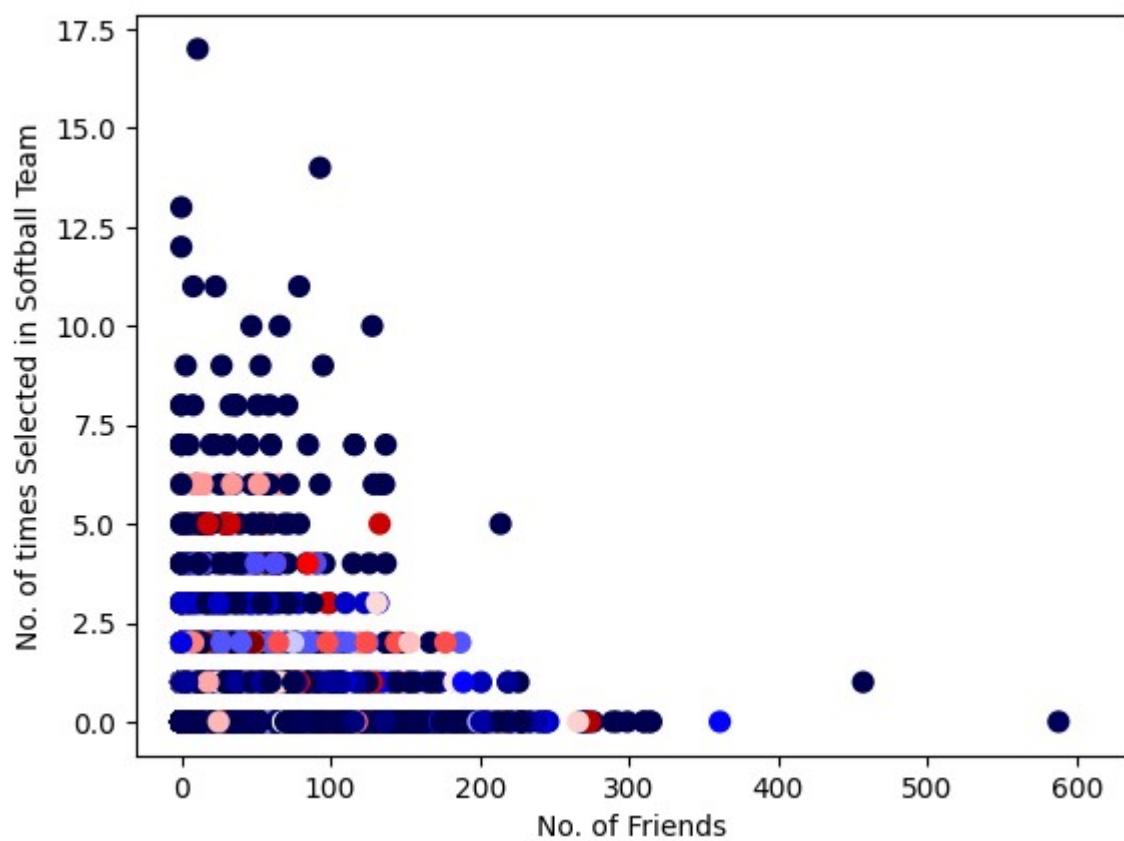
Social Circle vs Football Team selections



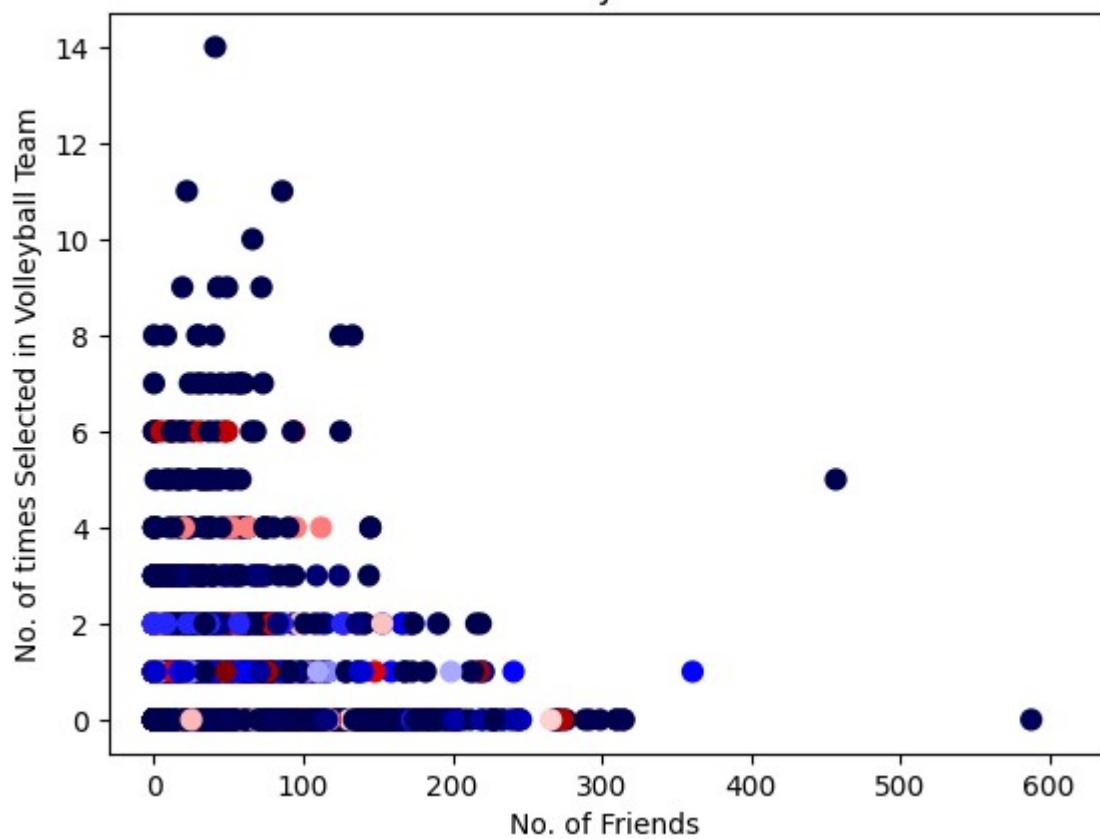
Social Circle vs Soccer Team selections



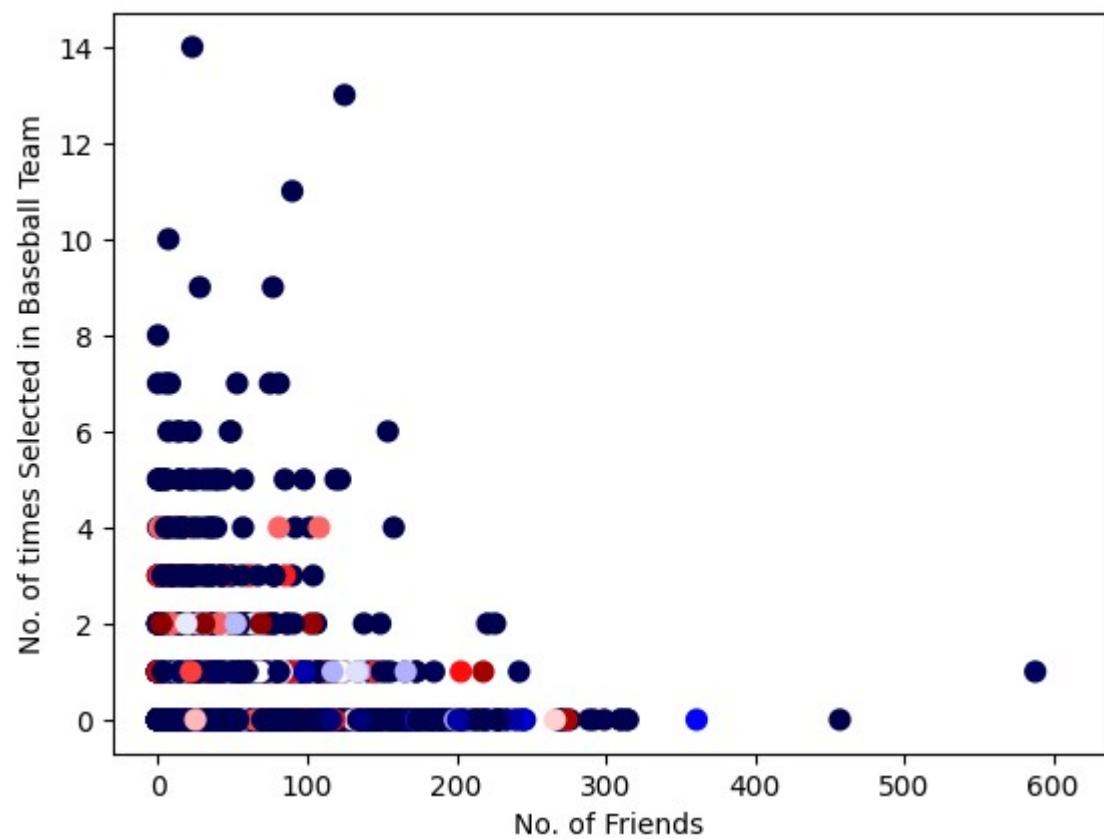
Social Circle vs Softball Team selections



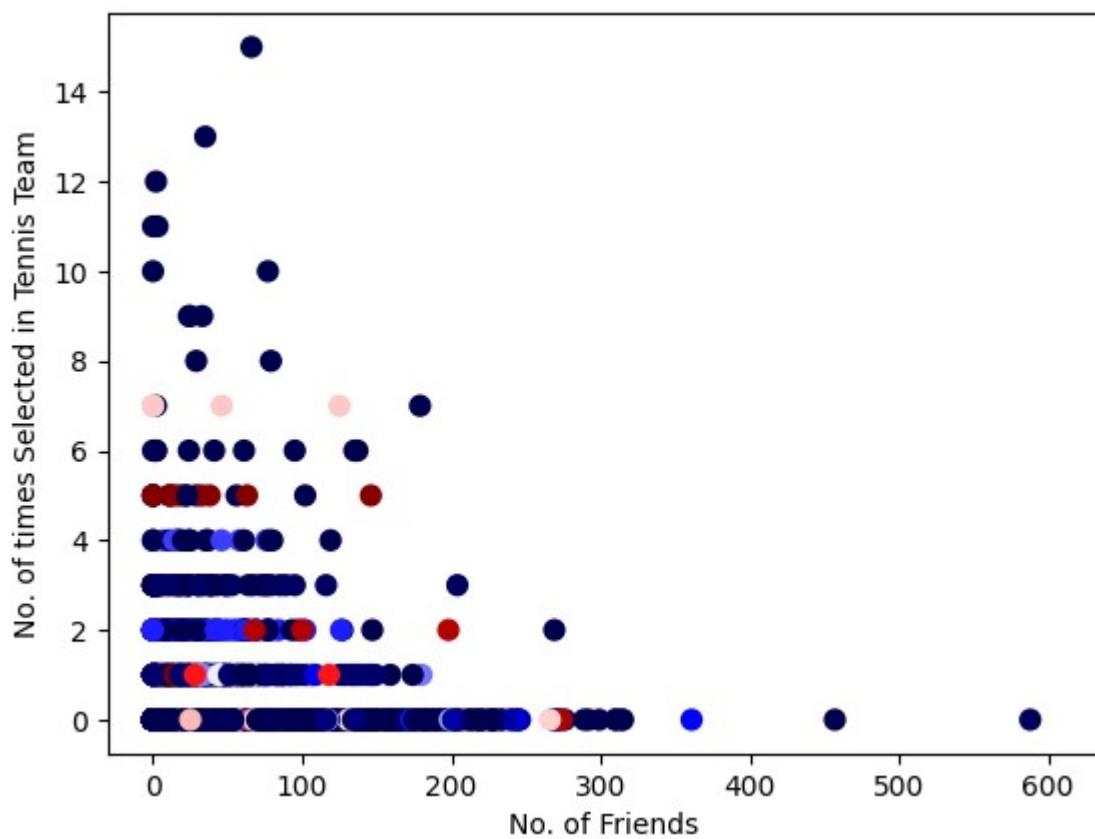
Social Circle vs Volleyball Team selections



Social Circle vs Baseball Team selections



Social Circle vs Tennis Team selections



For "Batch of 2007" - student dataset:

Total no. points considered for clustering the 2007 Batch Students is : 3663

Total Number of Clusters for 2007 batch found with DBSCAN are : 51 (Excluding 1 Cluster for Outliers)

Number of Points corresponding to cluster label '0' are : 2100

Number of Points corresponding to cluster label '1' are : 89

Number of Points corresponding to cluster label '2' are : 39

Number of Points corresponding to cluster label '3' are : 46

Number of Points corresponding to cluster label '4' are : 7

Number of Points corresponding to cluster label '5' are : 39

Number of Points corresponding to cluster label '6' are : 32

Number of Points corresponding to cluster label '7' are : 152

Number of Points corresponding to cluster label '8' are : 20

Number of Points corresponding to cluster label '9' are : 41

Number of Points corresponding to cluster label '10' are : 189

Number of Points corresponding to cluster label '11' are : 6

Number of Points corresponding to cluster label '12' are : 10

Number of Points corresponding to cluster label '13' are : 33

Number of Points corresponding to cluster label '14' are : 57

Number of Points corresponding to cluster label '15' are : 20

Number of Points corresponding to cluster label '16' are : 5

Number of Points corresponding to cluster label '17' are : 19

Number of Points corresponding to cluster label '18' are : 14

Number of Points corresponding to cluster label '19' are : 11

Number of Points corresponding to cluster label '20' are : 10

Number of Points corresponding to cluster label '21' are : 12

Number of Points corresponding to cluster label '22' are : 7

Number of Points corresponding to cluster label '23' are : 8

Number of Points corresponding to cluster label '24' are : 11

Number of Points corresponding to cluster label '25' are : 14

Number of Points corresponding to cluster label '26' are : 9

Number of Points corresponding to cluster label '27' are : 52

Number of Points corresponding to cluster label '28' are : 24

Number of Points corresponding to cluster label '29' are : 5

Number of Points corresponding to cluster label '30' are : 8

Number of Points corresponding to cluster label '31' are : 5

Number of Points corresponding to cluster label '32' are : 8

Number of Points corresponding to cluster label '33' are : 8

Number of Points corresponding to cluster label '34' are : 16

Number of Points corresponding to cluster label '35' are : 5

Number of Points corresponding to cluster label '36' are : 6

Number of Points corresponding to cluster label '37' are : 7

Number of Points corresponding to cluster label '38' are : 13

Number of Points corresponding to cluster label '39' are : 9

Number of Points corresponding to cluster label '40' are : 10

Number of Points corresponding to cluster label '41' are : 8

Number of Points corresponding to cluster label '42' are : 5

Number of Points corresponding to cluster label '43' are : 6

Number of Points corresponding to cluster label '44' are : 10

Number of Points corresponding to cluster label '45' are : 5

Number of Points corresponding to cluster label '46' are : 7

Number of Points corresponding to cluster label '47' are : 6

Number of Points corresponding to cluster label '48' are : 8

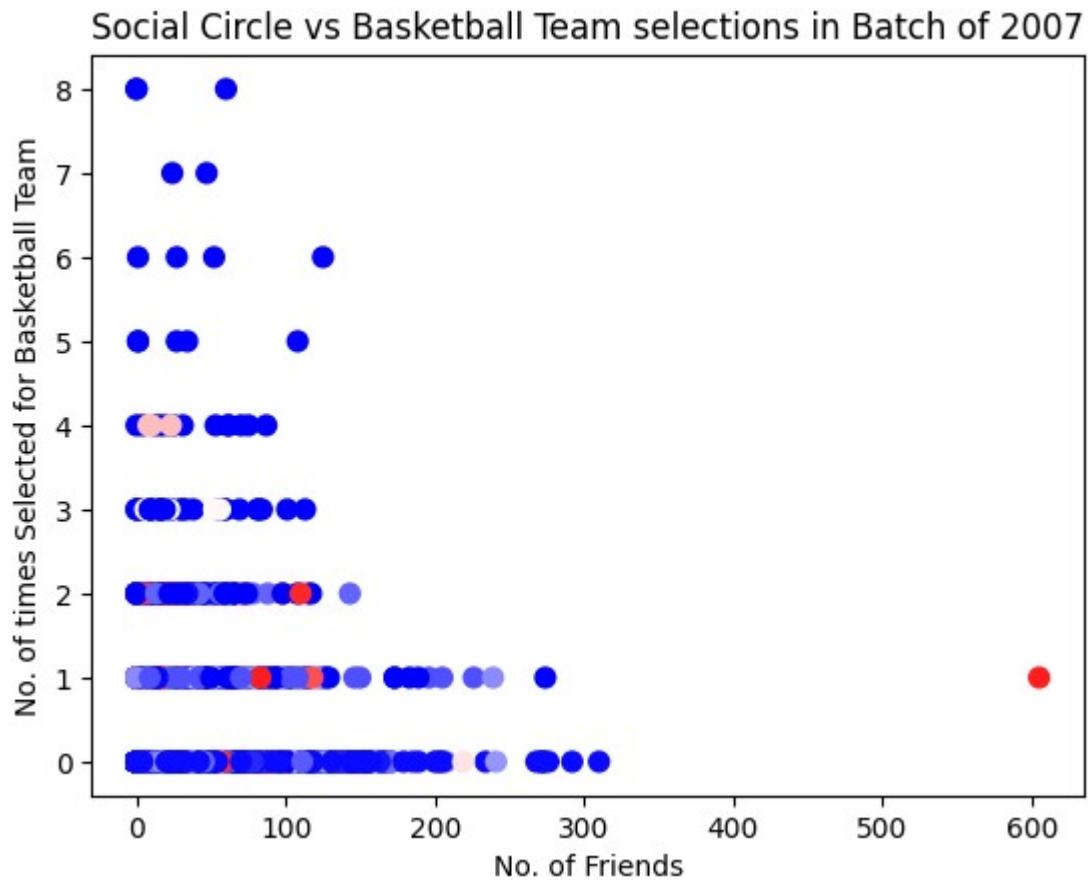
Number of Points corresponding to cluster label '49' are : 5

Number of Points corresponding to cluster label '50' are : 6

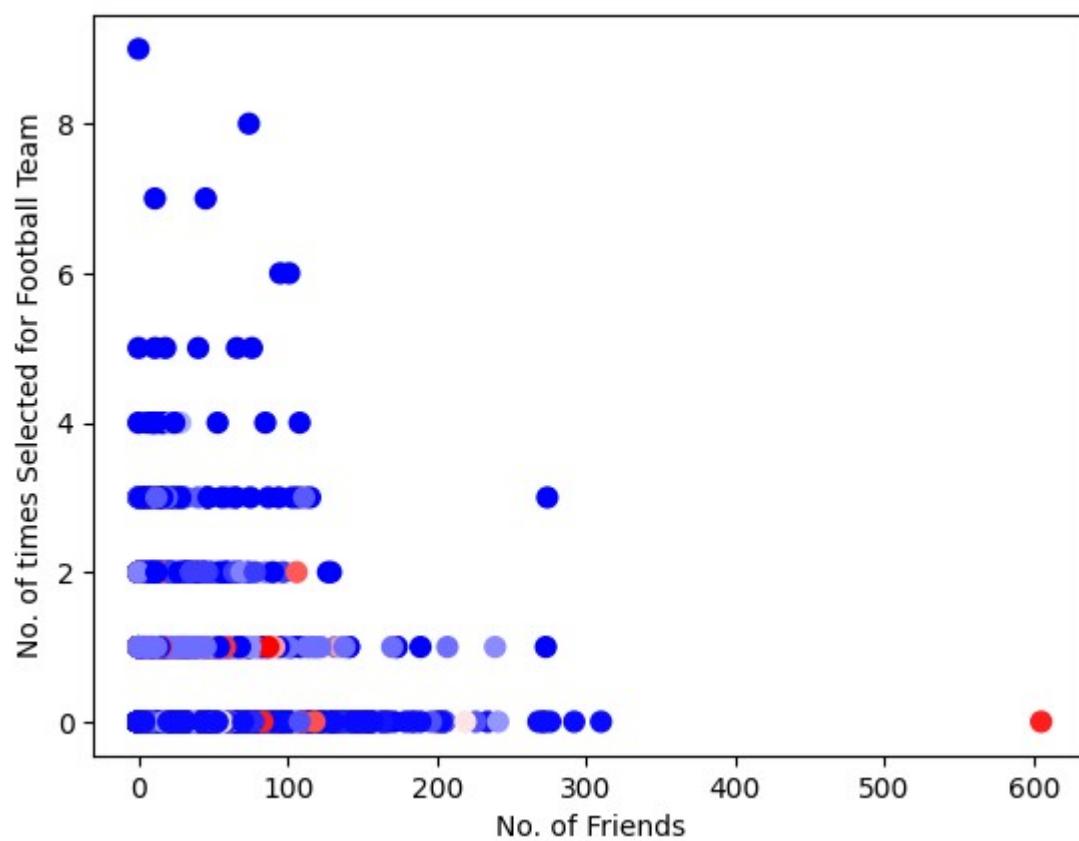
Number of Points corresponding to cluster label '-1' are : 421

ALL POINTS HAVE BEEN SUCCESSFULLY PARTITIONED FOR 2007 BATCH

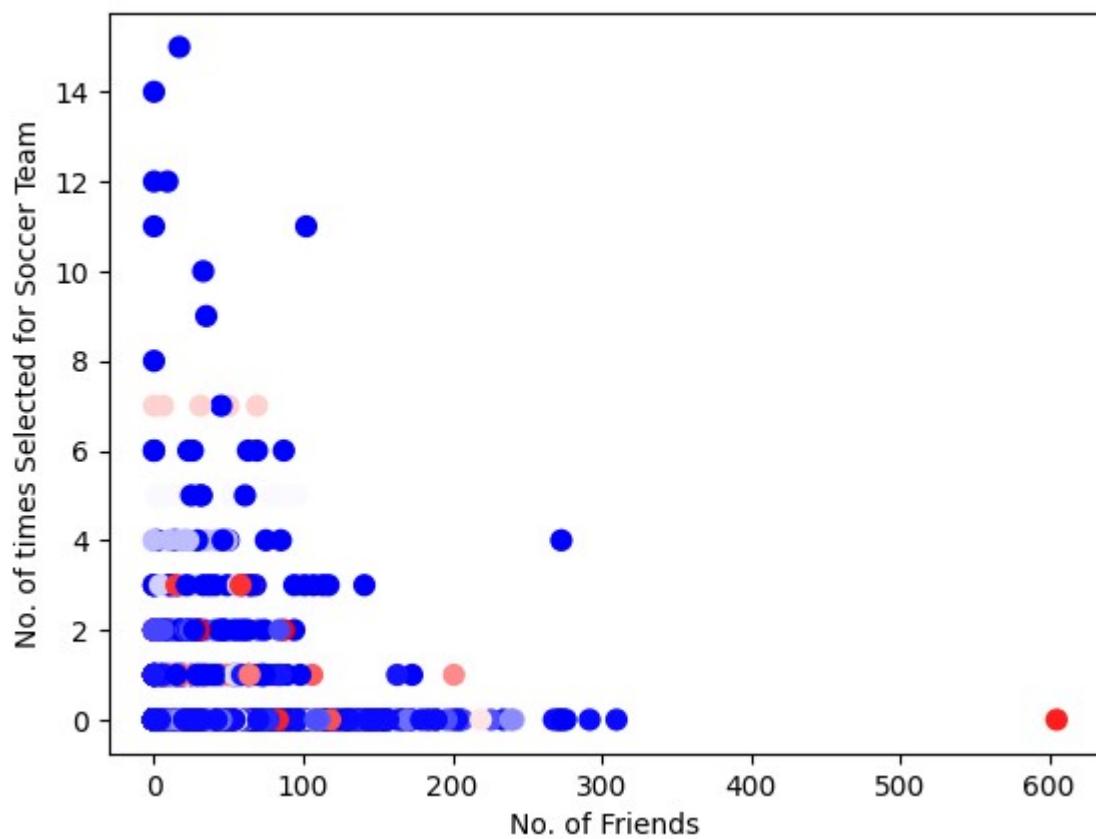
Silhouette score of the complete partitioning done for only 'Batch of 2007' - Students is : 0.8119518474015055



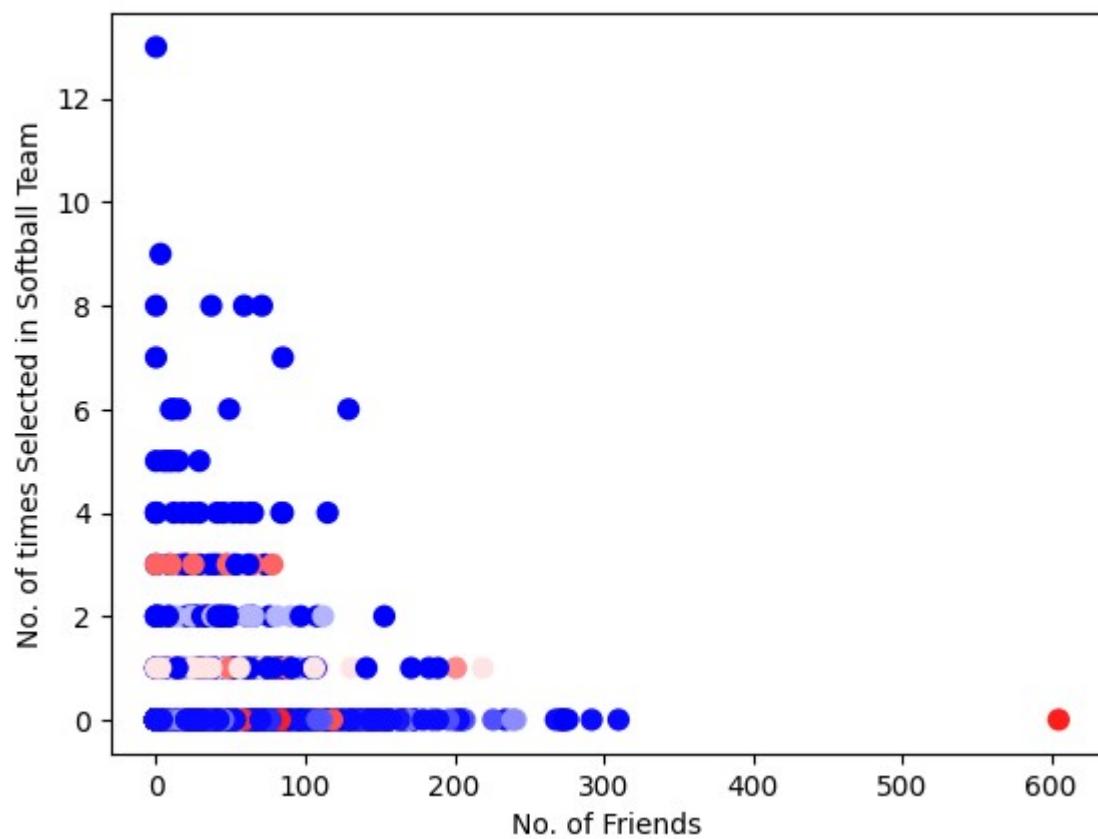
Social Circle vs Football Team selections in Batch of 2007



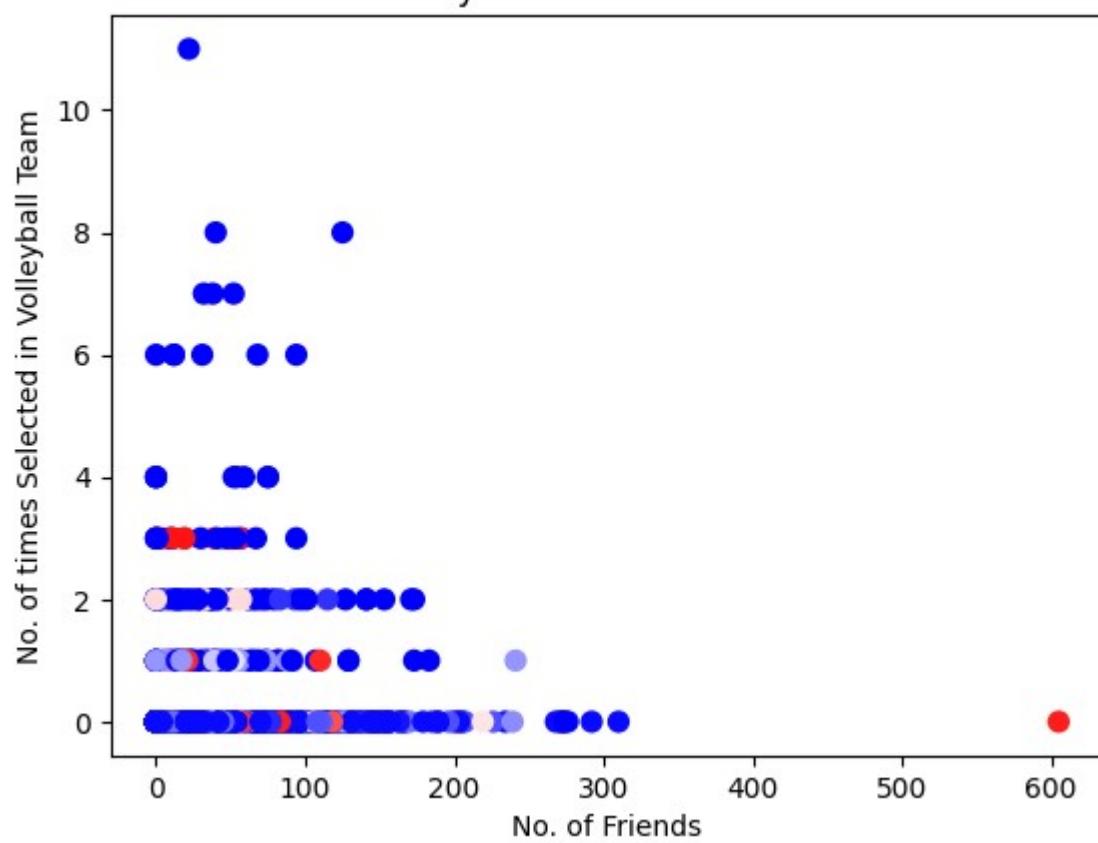
Social Circle vs Soccer Team selections in Batch of 2007



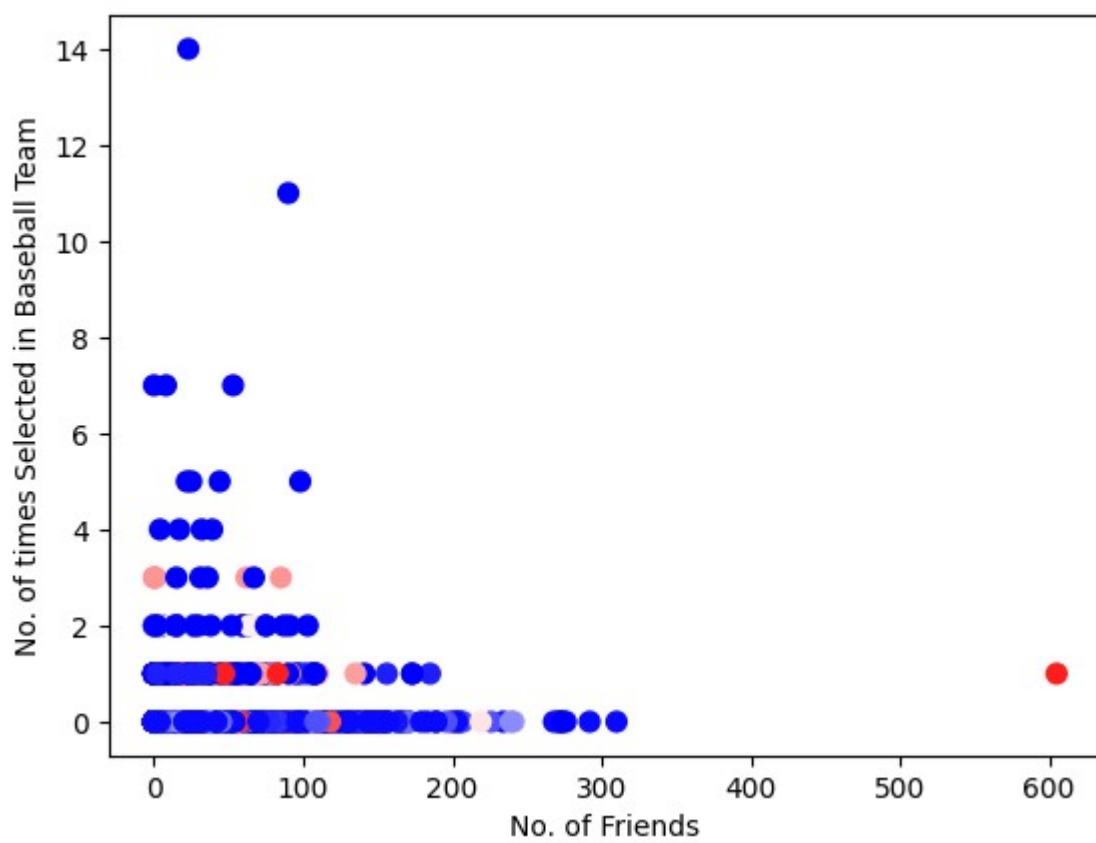
Social Circle vs Softball Team selections in Batch of 2007



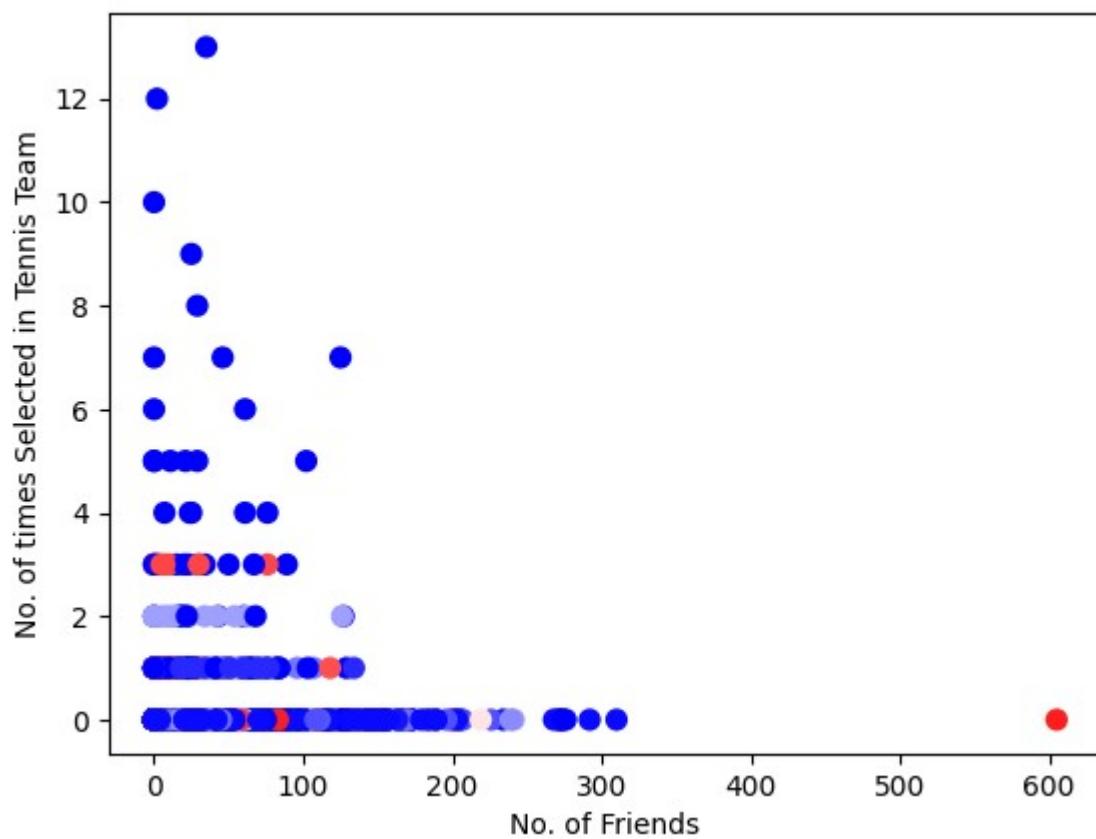
Social Circle vs Volleyball Team selections in Batch of 2007



Social Circle vs Baseball Team selections in Batch of 2007



Social Circle vs Tennis Team selections in Batch of 2007



Chapter 3: Parametric Agglomerative Hierarchical Clustering Algorithm based on Single Linkage Distances

This Algorithm Recursively merges pair of clusters of sample data; uses linkage distance. We have chosen Single Linkage Distance as the distance measure for our clustering purposes.

However, even though we are not parameterizing the No. of Clusters required, but to save on the computational overhead we have parameterized this algorithm by giving a distance_threshold input or, linkage-lifetime threshold to finish our merging beyond that distance.

For this assignment, we used the distance_threshold as 1.

We haven't used Dendrogram plots as they were difficult to interpret for the set of ~15000 datapoints. So, here also, clusterings have been depicted using scatter plots.

Now, we have done the Parametric Agglomerative Hierarchical Clustering of datasets two times in this assignment:

- a.) Once taking the Selected Features from Chapter 1, and all the data-points in the student dataset.
 - b.) Then, taking the Selected Features from Chapter 1, but only the data-points in the student dataset corresponding to Graduation year “2007” or “Batch of 2007”.

Python Code:

```
*****
*****  
  
data_for_clustering_whole_batch =  
student_db.iloc[:,[2,3,4,5,6,9,10]].values  
  
data_for_clustering_2007_batch = []  
data_for_clustering_2006_batch = []  
data_for_clustering_2008_batch = []  
data_for_clustering_2009_batch = []  
friends_2007 = []  
friends_2006 = []  
friends_2008 = []  
friends_2009 = []  
  
tot_students_2007_batch = 0  
tot_students_2006_batch = 0  
tot_students_2008_batch = 0  
tot_students_2009_batch = 0  
  
for i in range (0, tot_students, 1) :  
  
    if student_db.iat[i,0] == unique_gradyears[0] :  
        tot_students_2007_batch = tot_students_2007_batch + 1  
        a = student_db.iloc[i,[2,3,4,5,6,9,10]].values  
        friends_2007.append(student_db.iloc[i,[1]].values)  
        data_for_clustering_2007_batch.append(a)  
  
    elif student_db.iat[i,0] == unique_gradyears[1] :  
        tot_students_2006_batch = tot_students_2006_batch + 1  
        b = student_db.iloc[i,[2,3,4,5,6,9,10]].values  
        friends_2006.append(student_db.iloc[i,[1]].values)  
        data_for_clustering_2006_batch.append(b)  
  
    elif student_db.iat[i,0] == unique_gradyears[2] :  
        tot_students_2008_batch = tot_students_2008_batch + 1  
        c = student_db.iloc[i,[2,3,4,5,6,9,10]].values  
        friends_2008.append(student_db.iloc[i,[1]].values)  
        data_for_clustering_2008_batch.append(c)  
  
    elif student_db.iat[i,0] == unique_gradyears[3] :  
        tot_students_2009_batch = tot_students_2009_batch + 1  
        d = student_db.iloc[i,[2,3,4,5,6,9,10]].values  
        friends_2009.append(student_db.iloc[i,[1]].values)  
        data_for_clustering_2009_batch.append(d)
```



```

for p1 in range (0, len(X1), 1) :
    print(f"\nNumber of Points corresponding to cluster label
'{cluster_2_unique_labels[p1]}' are : {X1[p1]}\n")
    tot1=tot1+X1[p1]

if tot1==tot_points_2 :
    print("\nALL POINTS HAVE BEEN SUCCESSFULLY PARTITIONED FOR 2007
BATCH\n")
else :
    print("\nPlease count properly\n")

*****
*****
*****
*****
*****
```

`z= len(data_for_clustering_2007_batch)`

`A1=[]`

`A2=[]`

`A3=[]`

`A4=[]`

`A5=[]`

`A6=[]`

`A7=[]`

```

for u in range(0, z, 1) :
    A1.append(data_for_clustering_2007_batch[u][0])
    A2.append(data_for_clustering_2007_batch[u][1])
    A3.append(data_for_clustering_2007_batch[u][2])
    A4.append(data_for_clustering_2007_batch[u][3])
    A5.append(data_for_clustering_2007_batch[u][4])
    A6.append(data_for_clustering_2007_batch[u][5])
    A7.append(data_for_clustering_2007_batch[u][6])
```

```

plt.scatter(friends_2007, A1 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected for Basketball Team')
plt.title('Social Circle vs Basketball Team selections in Batch of 2007')
plt.show()
```

```

plt.scatter(friends_2007, A2 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected for Football Team')
plt.title('Social Circle vs Football Team selections in Batch of 2007')
plt.show()
```

```

plt.scatter(friends_2007, A3 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected for Soccer Team')
plt.title('Social Circle vs Soccer Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A4 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Softball Team')
plt.title('Social Circle vs Softball Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A5 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Volleyball Team')
plt.title('Social Circle vs Volleyball Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A6 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Baseball Team')
plt.title('Social Circle vs Baseball Team selections in Batch of 2007')
plt.show()

plt.scatter(friends_2007, A7 , c=CLUSTERS_2, cmap='bwr', s=50)
plt.xlabel('No. of Friends')
plt.ylabel('No. of times Selected in Tennis Team')
plt.title('Social Circle vs Tennis Team selections in Batch of 2007')
plt.show()

```

Outputs & Scatter-Plots:

For entire student dataset:

Total no. points considered for clustering the Whole Batch of Students is : 14734

Total Number of Clusters found for the complete batch with Agglomerative Hierarchical Clustering are : 1054

Number of Points corresponding to cluster label '0' are : 2

Number of Points corresponding to cluster label '1' are : 2

Number of Points corresponding to cluster label '2' are : 2

Number of Points corresponding to cluster label '3' are : 2

Number of Points corresponding to cluster label '4' are : 2

Number of Points corresponding to cluster label '5' are : 3

Number of Points corresponding to cluster label '6' are : 2

Number of Points corresponding to cluster label '7' are : 2

Number of Points corresponding to cluster label '8' are : 2

Number of Points corresponding to cluster label '9' are : 2

Number of Points corresponding to cluster label '10' are : 2

Number of Points corresponding to cluster label '11' are : 2

Number of Points corresponding to cluster label '12' are : 2

Number of Points corresponding to cluster label '13' are : 2

Number of Points corresponding to cluster label '14' are : 2

Number of Points corresponding to cluster label '15' are : 2

Number of Points corresponding to cluster label '16' are : 4

Number of Points corresponding to cluster label '17' are : 3

Number of Points corresponding to cluster label '18' are : 2

Number of Points corresponding to cluster label '19' are : 3

Number of Points corresponding to cluster label '20' are : 5

Number of Points corresponding to cluster label '21' are : 4

Number of Points corresponding to cluster label '22' are : 3

Number of Points corresponding to cluster label '23' are : 2

Number of Points corresponding to cluster label '24' are : 2

Number of Points corresponding to cluster label '25' are : 2

Number of Points corresponding to cluster label '26' are : 3

Number of Points corresponding to cluster label '27' are : 3

Number of Points corresponding to cluster label '28' are : 2

Number of Points corresponding to cluster label '29' are : 2

Number of Points corresponding to cluster label '30' are : 2

Number of Points corresponding to cluster label '31' are : 2

Number of Points corresponding to cluster label '32' are : 4

Number of Points corresponding to cluster label '33' are : 2

Number of Points corresponding to cluster label '34' are : 2

Number of Points corresponding to cluster label '35' are : 2

Number of Points corresponding to cluster label '36' are : 2

Number of Points corresponding to cluster label '37' are : 3

Number of Points corresponding to cluster label '38' are : 2

Number of Points corresponding to cluster label '39' are : 1

Number of Points corresponding to cluster label '40' are : 3

Number of Points corresponding to cluster label '41' are : 4

Number of Points corresponding to cluster label '42' are : 3

Number of Points corresponding to cluster label '43' are : 6

Number of Points corresponding to cluster label '44' are : 8

Number of Points corresponding to cluster label '45' are : 4

Number of Points corresponding to cluster label '46' are : 2

Number of Points corresponding to cluster label '47' are : 3

Number of Points corresponding to cluster label '48' are : 5

Number of Points corresponding to cluster label '49' are : 4

Number of Points corresponding to cluster label '50' are : 2

Number of Points corresponding to cluster label '51' are : 2

Number of Points corresponding to cluster label '52' are : 2

Number of Points corresponding to cluster label '53' are : 8

Number of Points corresponding to cluster label '54' are : 3

Number of Points corresponding to cluster label '55' are : 2

Number of Points corresponding to cluster label '56' are : 2

Number of Points corresponding to cluster label '57' are : 13

Number of Points corresponding to cluster label '58' are : 2

Number of Points corresponding to cluster label '59' are : 2

Number of Points corresponding to cluster label '60' are : 42

Number of Points corresponding to cluster label '61' are : 2

Number of Points corresponding to cluster label '62' are : 2

Number of Points corresponding to cluster label '63' are : 261

Number of Points corresponding to cluster label '64' are : 3

Number of Points corresponding to cluster label '65' are : 1

Number of Points corresponding to cluster label '66' are : 2

Number of Points corresponding to cluster label '67' are : 1

Number of Points corresponding to cluster label '68' are : 2

Number of Points corresponding to cluster label '69' are : 3

Number of Points corresponding to cluster label '70' are : 2

Number of Points corresponding to cluster label '71' are : 1

Number of Points corresponding to cluster label '72' are : 1

Number of Points corresponding to cluster label '73' are : 2

Number of Points corresponding to cluster label '74' are : 3

Number of Points corresponding to cluster label '75' are : 3

Number of Points corresponding to cluster label '76' are : 3

Number of Points corresponding to cluster label '77' are : 2

Number of Points corresponding to cluster label '78' are : 2

Number of Points corresponding to cluster label '79' are : 1

Number of Points corresponding to cluster label '80' are : 1

Number of Points corresponding to cluster label '81' are : 2

Number of Points corresponding to cluster label '82' are : 3

Number of Points corresponding to cluster label '83' are : 9

Number of Points corresponding to cluster label '84' are : 2

Number of Points corresponding to cluster label '85' are : 5

Number of Points corresponding to cluster label '86' are : 3

Number of Points corresponding to cluster label '87' are : 1

Number of Points corresponding to cluster label '88' are : 1

Number of Points corresponding to cluster label '89' are : 2

Number of Points corresponding to cluster label '90' are : 2

Number of Points corresponding to cluster label '91' are : 1

Number of Points corresponding to cluster label '92' are : 2

Number of Points corresponding to cluster label '93' are : 4

Number of Points corresponding to cluster label '94' are : 2

Number of Points corresponding to cluster label '95' are : 3

Number of Points corresponding to cluster label '96' are : 2

Number of Points corresponding to cluster label '97' are : 12

Number of Points corresponding to cluster label '98' are : 6

Number of Points corresponding to cluster label '99' are : 2

Number of Points corresponding to cluster label '100' are : 4

Number of Points corresponding to cluster label '101' are : 2

Number of Points corresponding to cluster label '102' are : 4

Number of Points corresponding to cluster label '103' are : 3

Number of Points corresponding to cluster label '104' are : 2

Number of Points corresponding to cluster label '105' are : 11

Number of Points corresponding to cluster label '106' are : 4

Number of Points corresponding to cluster label '107' are : 2

Number of Points corresponding to cluster label '108' are : 15

Number of Points corresponding to cluster label '109' are : 4

Number of Points corresponding to cluster label '110' are : 11

Number of Points corresponding to cluster label '111' are : 16

Number of Points corresponding to cluster label '112' are : 9

Number of Points corresponding to cluster label '113' are : 2

Number of Points corresponding to cluster label '114' are : 3

Number of Points corresponding to cluster label '115' are : 2

Number of Points corresponding to cluster label '116' are : 14

Number of Points corresponding to cluster label '117' are : 15

Number of Points corresponding to cluster label '118' are : 2

Number of Points corresponding to cluster label '119' are : 4

Number of Points corresponding to cluster label '120' are : 5

Number of Points corresponding to cluster label '121' are : 10

Number of Points corresponding to cluster label '122' are : 4

Number of Points corresponding to cluster label '123' are : 8

Number of Points corresponding to cluster label '124' are : 24

Number of Points corresponding to cluster label '125' are : 3

Number of Points corresponding to cluster label '126' are : 84

Number of Points corresponding to cluster label '127' are : 46

Number of Points corresponding to cluster label '128' are : 26

Number of Points corresponding to cluster label '129' are : 63

Number of Points corresponding to cluster label '130' are : 2

Number of Points corresponding to cluster label '131' are : 1

Number of Points corresponding to cluster label '132' are : 1

Number of Points corresponding to cluster label '133' are : 1

Number of Points corresponding to cluster label '134' are : 1

Number of Points corresponding to cluster label '135' are : 1

Number of Points corresponding to cluster label '136' are : 1

Number of Points corresponding to cluster label '137' are : 2

Number of Points corresponding to cluster label '138' are : 2

Number of Points corresponding to cluster label '139' are : 1

Number of Points corresponding to cluster label '140' are : 2

Number of Points corresponding to cluster label '141' are : 3

Number of Points corresponding to cluster label '142' are : 2

Number of Points corresponding to cluster label '143' are : 1

Number of Points corresponding to cluster label '144' are : 1

Number of Points corresponding to cluster label '145' are : 1

Number of Points corresponding to cluster label '146' are : 1

Number of Points corresponding to cluster label '147' are : 1

Number of Points corresponding to cluster label '148' are : 1

Number of Points corresponding to cluster label '149' are : 3

Number of Points corresponding to cluster label '150' are : 9

Number of Points corresponding to cluster label '151' are : 1

Number of Points corresponding to cluster label '152' are : 2

Number of Points corresponding to cluster label '153' are : 4

Number of Points corresponding to cluster label '154' are : 11

Number of Points corresponding to cluster label '155' are : 1

Number of Points corresponding to cluster label '156' are : 3

Number of Points corresponding to cluster label '157' are : 8

Number of Points corresponding to cluster label '158' are : 2

Number of Points corresponding to cluster label '159' are : 1

Number of Points corresponding to cluster label '160' are : 1

Number of Points corresponding to cluster label '161' are : 1

Number of Points corresponding to cluster label '162' are : 1

Number of Points corresponding to cluster label '163' are : 1

Number of Points corresponding to cluster label '164' are : 2

Number of Points corresponding to cluster label '165' are : 2

Number of Points corresponding to cluster label '166' are : 3

Number of Points corresponding to cluster label '167' are : 1

Number of Points corresponding to cluster label '168' are : 2

Number of Points corresponding to cluster label '169' are : 1

Number of Points corresponding to cluster label '170' are : 4

Number of Points corresponding to cluster label '171' are : 1

Number of Points corresponding to cluster label '172' are : 4

Number of Points corresponding to cluster label '173' are : 1

Number of Points corresponding to cluster label '174' are : 2

Number of Points corresponding to cluster label '175' are : 1

Number of Points corresponding to cluster label '176' are : 1

Number of Points corresponding to cluster label '177' are : 1

Number of Points corresponding to cluster label '178' are : 1

Number of Points corresponding to cluster label '179' are : 2

Number of Points corresponding to cluster label '180' are : 2

Number of Points corresponding to cluster label '181' are : 1

Number of Points corresponding to cluster label '182' are : 6

Number of Points corresponding to cluster label '183' are : 1

Number of Points corresponding to cluster label '184' are : 1

Number of Points corresponding to cluster label '185' are : 2

Number of Points corresponding to cluster label '186' are : 2

Number of Points corresponding to cluster label '187' are : 3

Number of Points corresponding to cluster label '188' are : 5

Number of Points corresponding to cluster label '189' are : 1

Number of Points corresponding to cluster label '190' are : 10

Number of Points corresponding to cluster label '191' are : 1

Number of Points corresponding to cluster label '192' are : 1

Number of Points corresponding to cluster label '193' are : 1

Number of Points corresponding to cluster label '194' are : 4

Number of Points corresponding to cluster label '195' are : 2

Number of Points corresponding to cluster label '196' are : 2

Number of Points corresponding to cluster label '197' are : 4

Number of Points corresponding to cluster label '198' are : 3

Number of Points corresponding to cluster label '199' are : 2

Number of Points corresponding to cluster label '200' are : 4

Number of Points corresponding to cluster label '201' are : 6

Number of Points corresponding to cluster label '202' are : 3

Number of Points corresponding to cluster label '203' are : 1

Number of Points corresponding to cluster label '204' are : 2

Number of Points corresponding to cluster label '205' are : 3

Number of Points corresponding to cluster label '206' are : 2

Number of Points corresponding to cluster label '207' are : 4

Number of Points corresponding to cluster label '208' are : 3

Number of Points corresponding to cluster label '209' are : 4

Number of Points corresponding to cluster label '210' are : 6

Number of Points corresponding to cluster label '211' are : 9

Number of Points corresponding to cluster label '212' are : 5

Number of Points corresponding to cluster label '213' are : 7

Number of Points corresponding to cluster label '214' are : 3

Number of Points corresponding to cluster label '215' are : 6

Number of Points corresponding to cluster label '216' are : 5

Number of Points corresponding to cluster label '217' are : 18

Number of Points corresponding to cluster label '218' are : 4

Number of Points corresponding to cluster label '219' are : 3

Number of Points corresponding to cluster label '220' are : 4

Number of Points corresponding to cluster label '221' are : 23

Number of Points corresponding to cluster label '222' are : 18

Number of Points corresponding to cluster label '223' are : 5

Number of Points corresponding to cluster label '224' are : 2

Number of Points corresponding to cluster label '225' are : 21

Number of Points corresponding to cluster label '226' are : 2

Number of Points corresponding to cluster label '227' are : 11

Number of Points corresponding to cluster label '228' are : 6

Number of Points corresponding to cluster label '229' are : 2

Number of Points corresponding to cluster label '230' are : 10

Number of Points corresponding to cluster label '231' are : 2

Number of Points corresponding to cluster label '232' are : 10

Number of Points corresponding to cluster label '233' are : 2

Number of Points corresponding to cluster label '234' are : 2

Number of Points corresponding to cluster label '235' are : 327

Number of Points corresponding to cluster label '236' are : 4

Number of Points corresponding to cluster label '237' are : 15

Number of Points corresponding to cluster label '238' are : 4

Number of Points corresponding to cluster label '239' are : 5

Number of Points corresponding to cluster label '240' are : 2

Number of Points corresponding to cluster label '241' are : 13

Number of Points corresponding to cluster label '242' are : 3

Number of Points corresponding to cluster label '243' are : 14

Number of Points corresponding to cluster label '244' are : 11

Number of Points corresponding to cluster label '245' are : 73

Number of Points corresponding to cluster label '246' are : 25

Number of Points corresponding to cluster label '247' are : 5

Number of Points corresponding to cluster label '248' are : 24

Number of Points corresponding to cluster label '249' are : 28

Number of Points corresponding to cluster label '250' are : 4

Number of Points corresponding to cluster label '251' are : 20

Number of Points corresponding to cluster label '252' are : 6

Number of Points corresponding to cluster label '253' are : 3

Number of Points corresponding to cluster label '254' are : 60

Number of Points corresponding to cluster label '255' are : 9

Number of Points corresponding to cluster label '256' are : 4

Number of Points corresponding to cluster label '257' are : 60

Number of Points corresponding to cluster label '258' are : 55

Number of Points corresponding to cluster label '259' are : 25

Number of Points corresponding to cluster label '260' are : 155

Number of Points corresponding to cluster label '261' are : 230

Number of Points corresponding to cluster label '262' are : 4

Number of Points corresponding to cluster label '263' are : 1

Number of Points corresponding to cluster label '264' are : 1

Number of Points corresponding to cluster label '265' are : 1

Number of Points corresponding to cluster label '266' are : 1

Number of Points corresponding to cluster label '267' are : 1

Number of Points corresponding to cluster label '268' are : 1

Number of Points corresponding to cluster label '269' are : 1

Number of Points corresponding to cluster label '270' are : 1

Number of Points corresponding to cluster label '271' are : 1

Number of Points corresponding to cluster label '272' are : 1

Number of Points corresponding to cluster label '273' are : 1

Number of Points corresponding to cluster label '274' are : 1

Number of Points corresponding to cluster label '275' are : 1

Number of Points corresponding to cluster label '276' are : 1

Number of Points corresponding to cluster label '277' are : 1

Number of Points corresponding to cluster label '278' are : 1

Number of Points corresponding to cluster label '279' are : 1

Number of Points corresponding to cluster label '280' are : 1

Number of Points corresponding to cluster label '281' are : 1

Number of Points corresponding to cluster label '282' are : 1

Number of Points corresponding to cluster label '283' are : 1

Number of Points corresponding to cluster label '284' are : 1

Number of Points corresponding to cluster label '285' are : 1

Number of Points corresponding to cluster label '286' are : 3

Number of Points corresponding to cluster label '287' are : 1

Number of Points corresponding to cluster label '288' are : 1

Number of Points corresponding to cluster label '289' are : 1

Number of Points corresponding to cluster label '290' are : 1

Number of Points corresponding to cluster label '291' are : 1

Number of Points corresponding to cluster label '292' are : 1

Number of Points corresponding to cluster label '293' are : 1

Number of Points corresponding to cluster label '294' are : 1

Number of Points corresponding to cluster label '295' are : 1

Number of Points corresponding to cluster label '296' are : 1

Number of Points corresponding to cluster label '297' are : 1

Number of Points corresponding to cluster label '298' are : 1

Number of Points corresponding to cluster label '299' are : 1

Number of Points corresponding to cluster label '300' are : 1

Number of Points corresponding to cluster label '301' are : 1

Number of Points corresponding to cluster label '302' are : 2

Number of Points corresponding to cluster label '303' are : 1

Number of Points corresponding to cluster label '304' are : 1

Number of Points corresponding to cluster label '305' are : 1

Number of Points corresponding to cluster label '306' are : 1

Number of Points corresponding to cluster label '307' are : 1

Number of Points corresponding to cluster label '308' are : 1

Number of Points corresponding to cluster label '309' are : 1

Number of Points corresponding to cluster label '310' are : 1

Number of Points corresponding to cluster label '311' are : 1

Number of Points corresponding to cluster label '312' are : 1

Number of Points corresponding to cluster label '313' are : 1

Number of Points corresponding to cluster label '314' are : 1

Number of Points corresponding to cluster label '315' are : 1

Number of Points corresponding to cluster label '316' are : 2

Number of Points corresponding to cluster label '317' are : 3

Number of Points corresponding to cluster label '318' are : 1

Number of Points corresponding to cluster label '319' are : 1

Number of Points corresponding to cluster label '320' are : 1

Number of Points corresponding to cluster label '321' are : 1

Number of Points corresponding to cluster label '322' are : 1

Number of Points corresponding to cluster label '323' are : 1

Number of Points corresponding to cluster label '324' are : 1

Number of Points corresponding to cluster label '325' are : 1

Number of Points corresponding to cluster label '326' are : 1

Number of Points corresponding to cluster label '327' are : 1

Number of Points corresponding to cluster label '328' are : 1

Number of Points corresponding to cluster label '329' are : 1

Number of Points corresponding to cluster label '330' are : 2

Number of Points corresponding to cluster label '331' are : 1

Number of Points corresponding to cluster label '332' are : 2

Number of Points corresponding to cluster label '333' are : 1

Number of Points corresponding to cluster label '334' are : 1

Number of Points corresponding to cluster label '335' are : 1

Number of Points corresponding to cluster label '336' are : 1

Number of Points corresponding to cluster label '337' are : 1

Number of Points corresponding to cluster label '338' are : 2

Number of Points corresponding to cluster label '339' are : 1

Number of Points corresponding to cluster label '340' are : 1

Number of Points corresponding to cluster label '341' are : 1

Number of Points corresponding to cluster label '342' are : 1

Number of Points corresponding to cluster label '343' are : 1

Number of Points corresponding to cluster label '344' are : 1

Number of Points corresponding to cluster label '345' are : 1

Number of Points corresponding to cluster label '346' are : 1

Number of Points corresponding to cluster label '347' are : 1

Number of Points corresponding to cluster label '348' are : 1

Number of Points corresponding to cluster label '349' are : 1

Number of Points corresponding to cluster label '350' are : 7

Number of Points corresponding to cluster label '351' are : 1

Number of Points corresponding to cluster label '352' are : 1

Number of Points corresponding to cluster label '353' are : 1

Number of Points corresponding to cluster label '354' are : 1

Number of Points corresponding to cluster label '355' are : 1

Number of Points corresponding to cluster label '356' are : 1

Number of Points corresponding to cluster label '357' are : 1

Number of Points corresponding to cluster label '358' are : 1

Number of Points corresponding to cluster label '359' are : 1

Number of Points corresponding to cluster label '360' are : 2

Number of Points corresponding to cluster label '361' are : 1

Number of Points corresponding to cluster label '362' are : 3

Number of Points corresponding to cluster label '363' are : 1

Number of Points corresponding to cluster label '364' are : 1

Number of Points corresponding to cluster label '365' are : 2

Number of Points corresponding to cluster label '366' are : 3

Number of Points corresponding to cluster label '367' are : 1

Number of Points corresponding to cluster label '368' are : 1

Number of Points corresponding to cluster label '369' are : 1

Number of Points corresponding to cluster label '370' are : 1

Number of Points corresponding to cluster label '371' are : 1

Number of Points corresponding to cluster label '372' are : 1

Number of Points corresponding to cluster label '373' are : 1

Number of Points corresponding to cluster label '374' are : 4

Number of Points corresponding to cluster label '375' are : 1

Number of Points corresponding to cluster label '376' are : 1

Number of Points corresponding to cluster label '377' are : 1

Number of Points corresponding to cluster label '378' are : 7

Number of Points corresponding to cluster label '379' are : 1

Number of Points corresponding to cluster label '380' are : 1

Number of Points corresponding to cluster label '381' are : 5

Number of Points corresponding to cluster label '382' are : 2

Number of Points corresponding to cluster label '383' are : 1

Number of Points corresponding to cluster label '384' are : 1

Number of Points corresponding to cluster label '385' are : 1

Number of Points corresponding to cluster label '386' are : 1

Number of Points corresponding to cluster label '387' are : 1

Number of Points corresponding to cluster label '388' are : 1

Number of Points corresponding to cluster label '389' are : 4

Number of Points corresponding to cluster label '390' are : 2

Number of Points corresponding to cluster label '391' are : 1

Number of Points corresponding to cluster label '392' are : 1

Number of Points corresponding to cluster label '393' are : 1

Number of Points corresponding to cluster label '394' are : 2

Number of Points corresponding to cluster label '395' are : 1

Number of Points corresponding to cluster label '396' are : 1

Number of Points corresponding to cluster label '397' are : 3

Number of Points corresponding to cluster label '398' are : 2

Number of Points corresponding to cluster label '399' are : 1

Number of Points corresponding to cluster label '400' are : 3

Number of Points corresponding to cluster label '401' are : 1

Number of Points corresponding to cluster label '402' are : 1

Number of Points corresponding to cluster label '403' are : 1

Number of Points corresponding to cluster label '404' are : 2

Number of Points corresponding to cluster label '405' are : 4

Number of Points corresponding to cluster label '406' are : 1

Number of Points corresponding to cluster label '407' are : 1

Number of Points corresponding to cluster label '408' are : 1

Number of Points corresponding to cluster label '409' are : 2

Number of Points corresponding to cluster label '410' are : 2

Number of Points corresponding to cluster label '411' are : 3

Number of Points corresponding to cluster label '412' are : 4

Number of Points corresponding to cluster label '413' are : 4

Number of Points corresponding to cluster label '414' are : 2

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Number of Points corresponding to cluster label '952' are : 1

Number of Points corresponding to cluster label '953' are : 1

Number of Points corresponding to cluster label '954' are : 1

Number of Points corresponding to cluster label '955' are : 1

Number of Points corresponding to cluster label '956' are : 1

Number of Points corresponding to cluster label '957' are : 1

Number of Points corresponding to cluster label '958' are : 1

Number of Points corresponding to cluster label '959' are : 1

Number of Points corresponding to cluster label '960' are : 1

Number of Points corresponding to cluster label '961' are : 1

Number of Points corresponding to cluster label '962' are : 1

Number of Points corresponding to cluster label '963' are : 1

Number of Points corresponding to cluster label '964' are : 1

Number of Points corresponding to cluster label '965' are : 1

Number of Points corresponding to cluster label '966' are : 3

Number of Points corresponding to cluster label '967' are : 1

Number of Points corresponding to cluster label '968' are : 1

Number of Points corresponding to cluster label '969' are : 1

Number of Points corresponding to cluster label '970' are : 1

Number of Points corresponding to cluster label '971' are : 1

Number of Points corresponding to cluster label '972' are : 1

Number of Points corresponding to cluster label '973' are : 1

Number of Points corresponding to cluster label '974' are : 26

Number of Points corresponding to cluster label '975' are : 1

Number of Points corresponding to cluster label '976' are : 1

Number of Points corresponding to cluster label '977' are : 1

Number of Points corresponding to cluster label '978' are : 1

Number of Points corresponding to cluster label '979' are : 1

Number of Points corresponding to cluster label '980' are : 1

Number of Points corresponding to cluster label '981' are : 1

Number of Points corresponding to cluster label '982' are : 1

Number of Points corresponding to cluster label '983' are : 1

Number of Points corresponding to cluster label '984' are : 1

Number of Points corresponding to cluster label '985' are : 1

Number of Points corresponding to cluster label '986' are : 1

Number of Points corresponding to cluster label '987' are : 1

Number of Points corresponding to cluster label '988' are : 1

Number of Points corresponding to cluster label '989' are : 1

Number of Points corresponding to cluster label '990' are : 3

Number of Points corresponding to cluster label '991' are : 1

Number of Points corresponding to cluster label '992' are : 1

Number of Points corresponding to cluster label '993' are : 1

Number of Points corresponding to cluster label '994' are : 1

Number of Points corresponding to cluster label '995' are : 1

Number of Points corresponding to cluster label '996' are : 1

Number of Points corresponding to cluster label '997' are : 1

Number of Points corresponding to cluster label '998' are : 1

Number of Points corresponding to cluster label '999' are : 1

Number of Points corresponding to cluster label '1000' are : 1

Number of Points corresponding to cluster label '1001' are : 1

Number of Points corresponding to cluster label '1002' are : 46

Number of Points corresponding to cluster label '1003' are : 1

Number of Points corresponding to cluster label '1004' are : 1

Number of Points corresponding to cluster label '1005' are : 1

Number of Points corresponding to cluster label '1006' are : 84

Number of Points corresponding to cluster label '1007' are : 1

Number of Points corresponding to cluster label '1008' are : 1

Number of Points corresponding to cluster label '1009' are : 1

Number of Points corresponding to cluster label '1010' are : 11

Number of Points corresponding to cluster label '1011' are : 1

Number of Points corresponding to cluster label '1012' are : 1

Number of Points corresponding to cluster label '1013' are : 1

Number of Points corresponding to cluster label '1014' are : 27

Number of Points corresponding to cluster label '1015' are : 1

Number of Points corresponding to cluster label '1016' are : 1

Number of Points corresponding to cluster label '1017' are : 1

Number of Points corresponding to cluster label '1018' are : 66

Number of Points corresponding to cluster label '1019' are : 1

Number of Points corresponding to cluster label '1020' are : 1

Number of Points corresponding to cluster label '1021' are : 1

Number of Points corresponding to cluster label '1022' are : 13

Number of Points corresponding to cluster label '1023' are : 1

Number of Points corresponding to cluster label '1024' are : 1

Number of Points corresponding to cluster label '1025' are : 1

Number of Points corresponding to cluster label '1026' are : 1

Number of Points corresponding to cluster label '1027' are : 1

Number of Points corresponding to cluster label '1028' are : 1

Number of Points corresponding to cluster label '1029' are : 1

Number of Points corresponding to cluster label '1030' are : 1

Number of Points corresponding to cluster label '1031' are : 1

Number of Points corresponding to cluster label '1032' are : 1

Number of Points corresponding to cluster label '1033' are : 1

Number of Points corresponding to cluster label '1034' are : 14

Number of Points corresponding to cluster label '1035' are : 1

Number of Points corresponding to cluster label '1036' are : 1

Number of Points corresponding to cluster label '1037' are : 1

Number of Points corresponding to cluster label '1038' are : 4

Number of Points corresponding to cluster label '1039' are : 1

Number of Points corresponding to cluster label '1040' are : 1

Number of Points corresponding to cluster label '1041' are : 1

Number of Points corresponding to cluster label '1042' are : 18

Number of Points corresponding to cluster label '1043' are : 1

Number of Points corresponding to cluster label '1044' are : 1

Number of Points corresponding to cluster label '1045' are : 1

Number of Points corresponding to cluster label '1046' are : 709

Number of Points corresponding to cluster label '1047' are : 1

Number of Points corresponding to cluster label '1048' are : 1

Number of Points corresponding to cluster label '1049' are : 1

Number of Points corresponding to cluster label '1050' are : 537

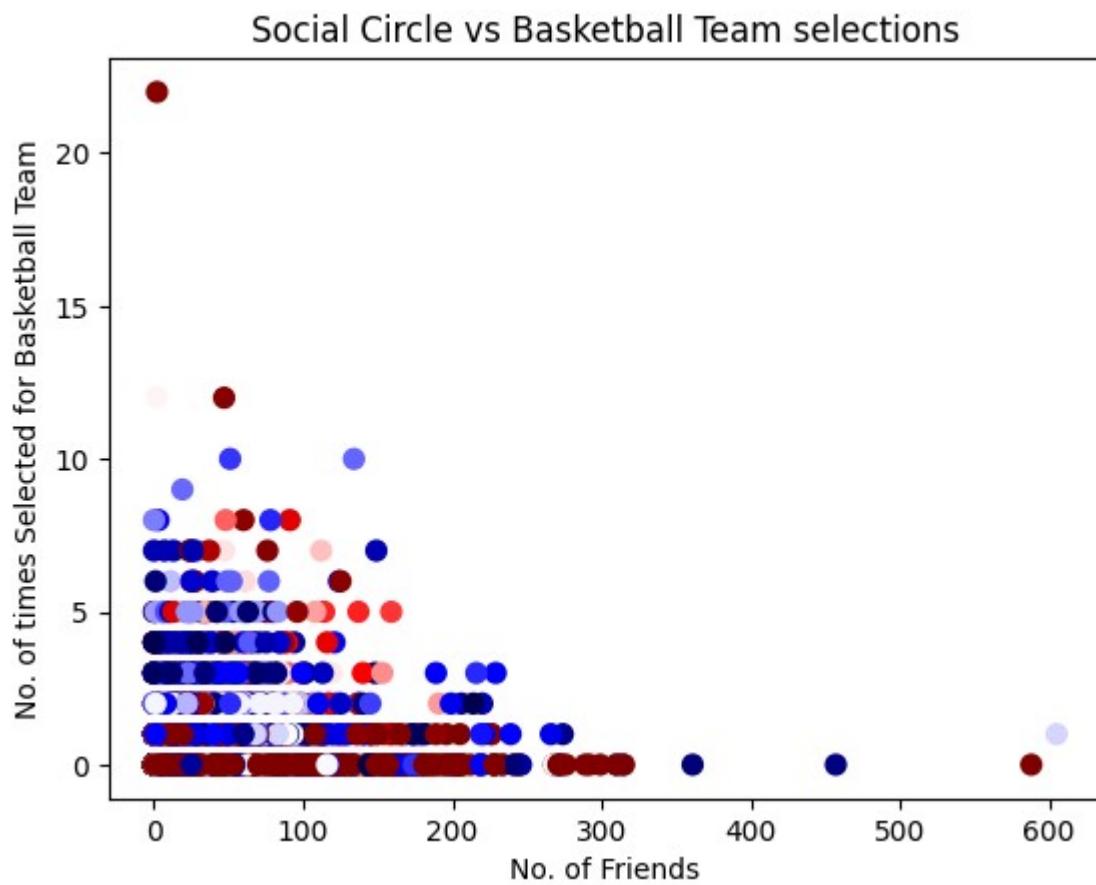
Number of Points corresponding to cluster label '1051' are : 1

Number of Points corresponding to cluster label '1052' are : 166

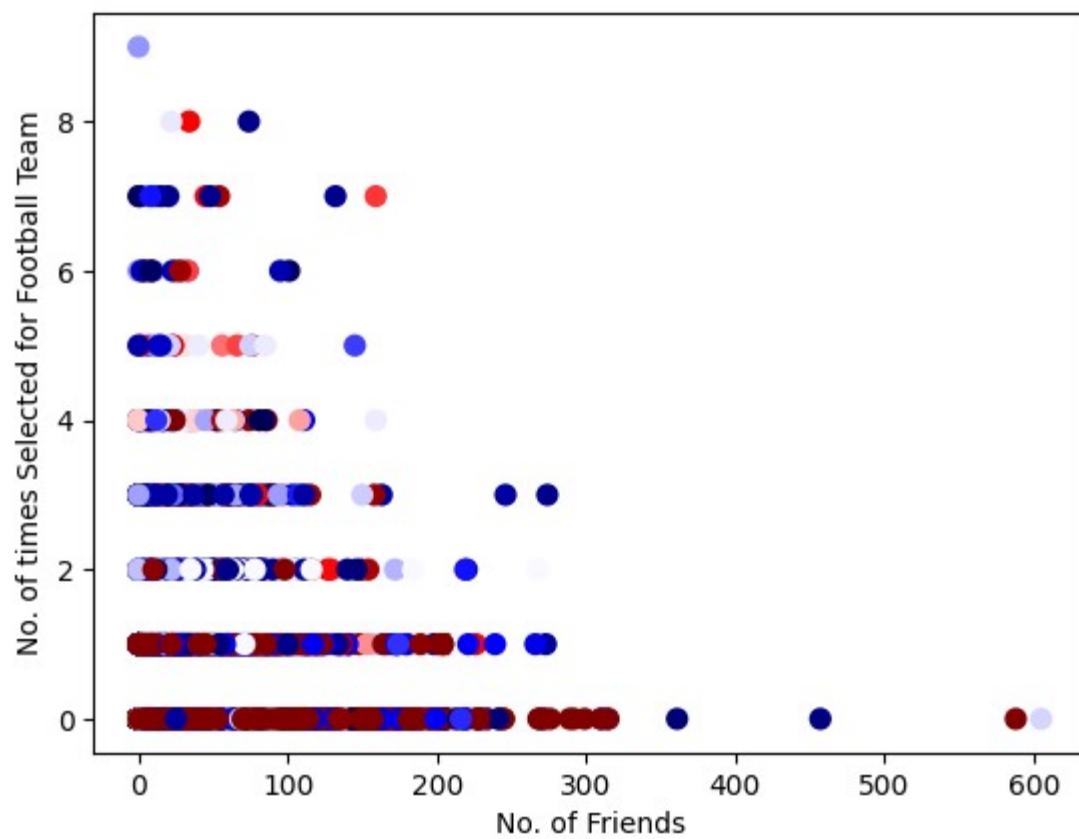
Number of Points corresponding to cluster label '1053' are : 8252

ALL POINTS HAVE BEEN SUCCESSFULLY PARTITIONED FOR THE COMPLETE BATCH

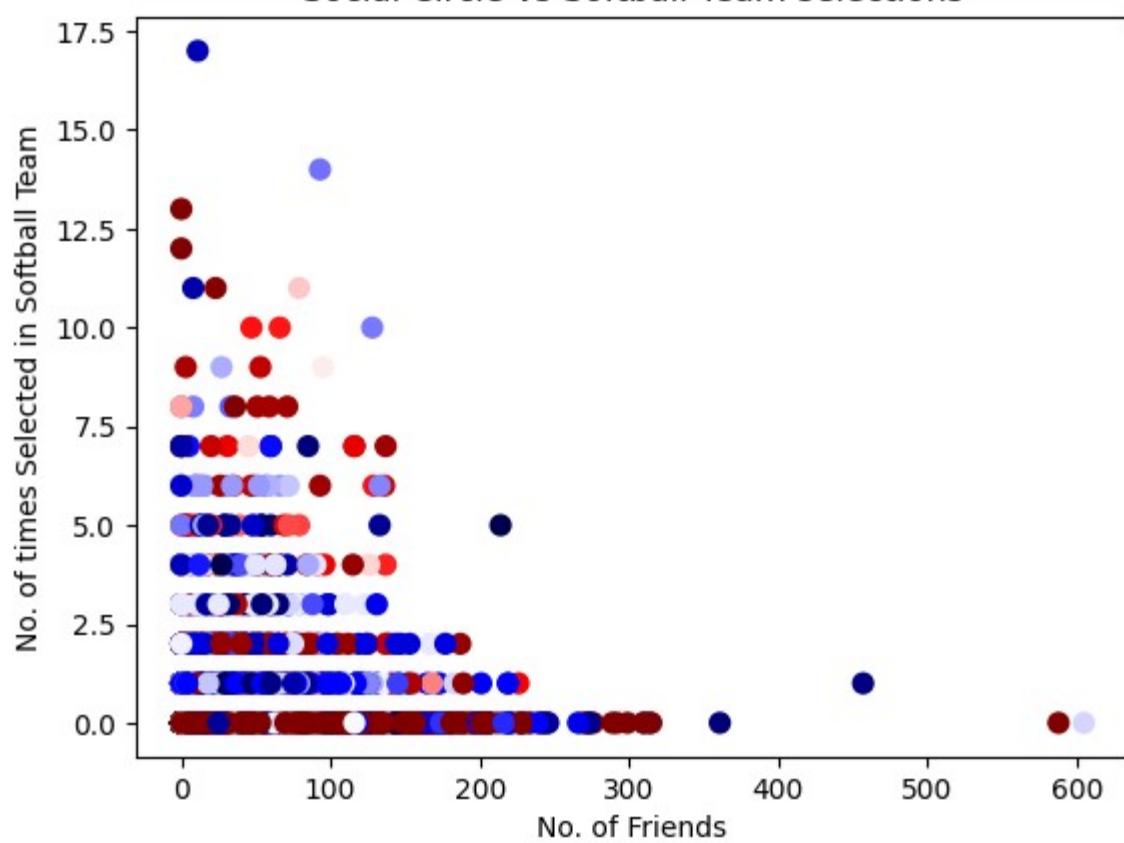
Silhouette score of the complete partitioning done for Whole Batch of Students is : 0.952015745893851



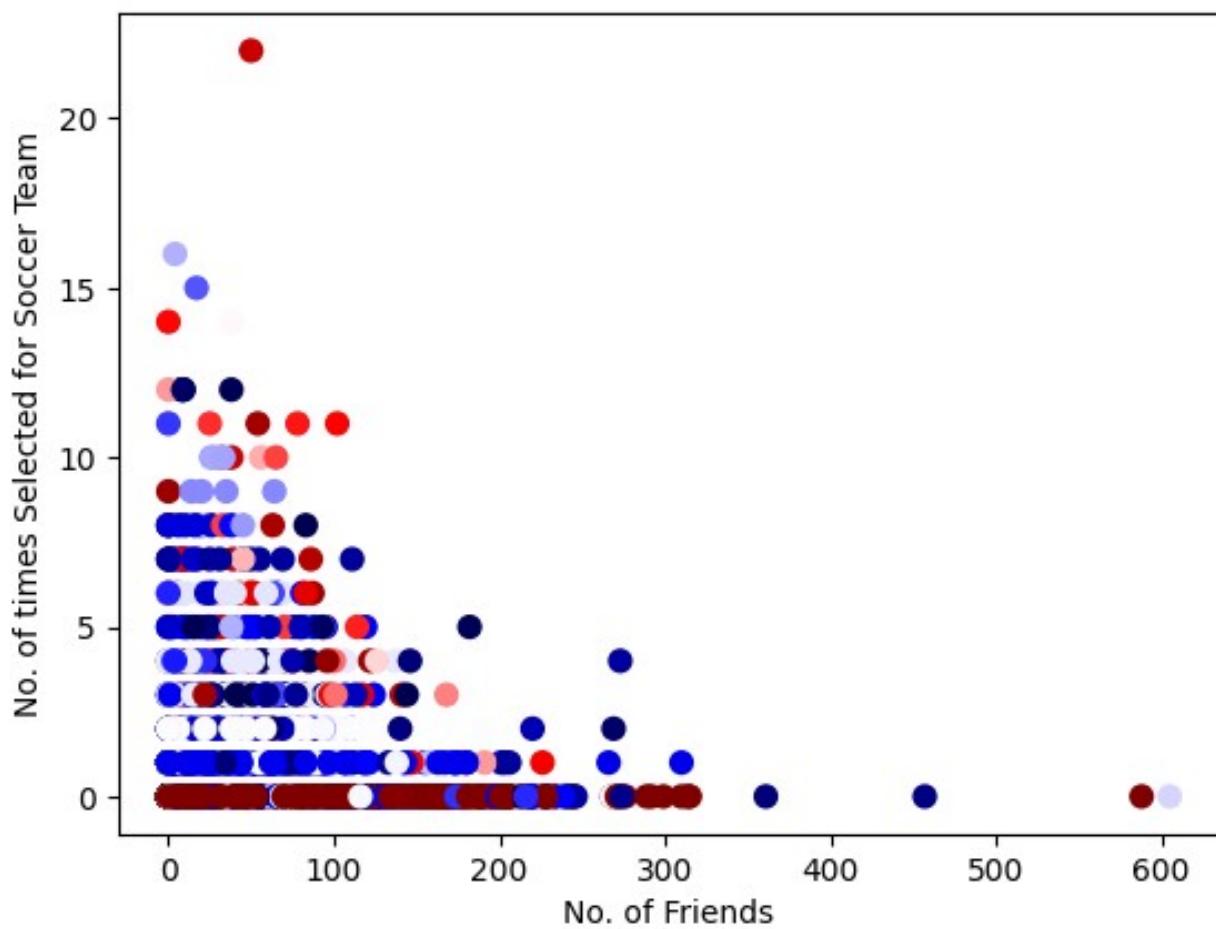
Social Circle vs Football Team selections



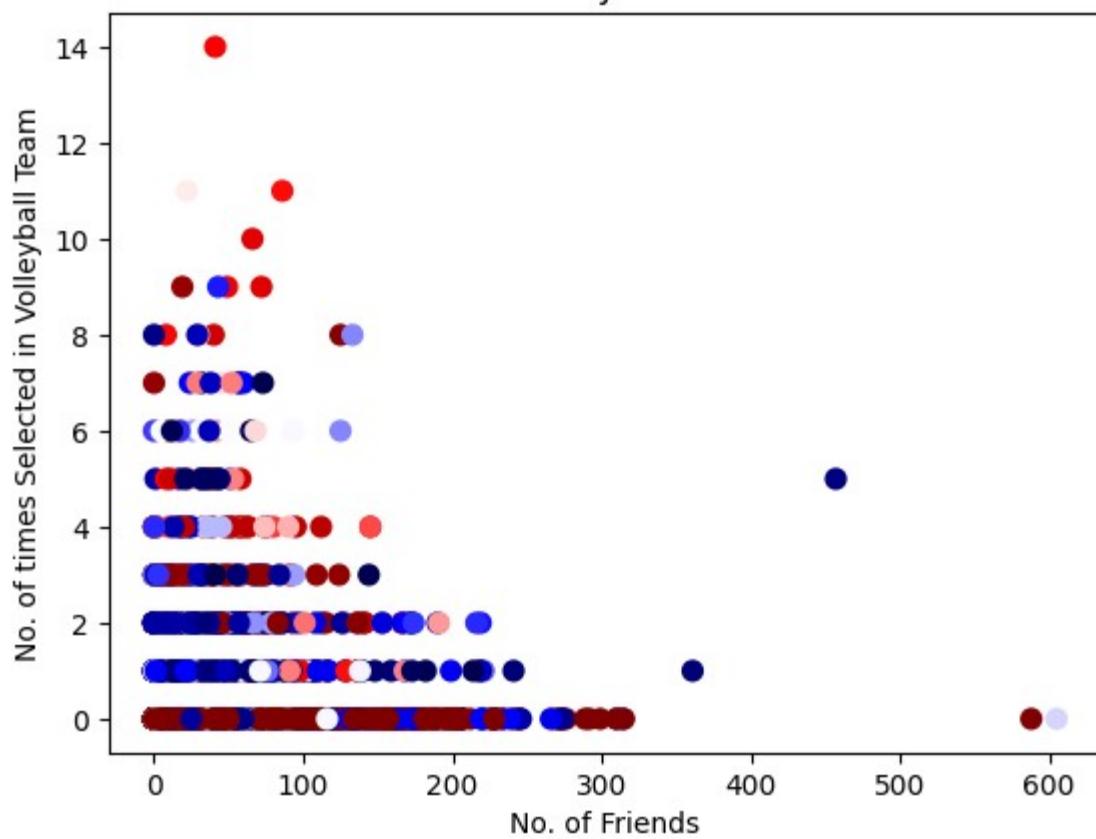
Social Circle vs Softball Team selections



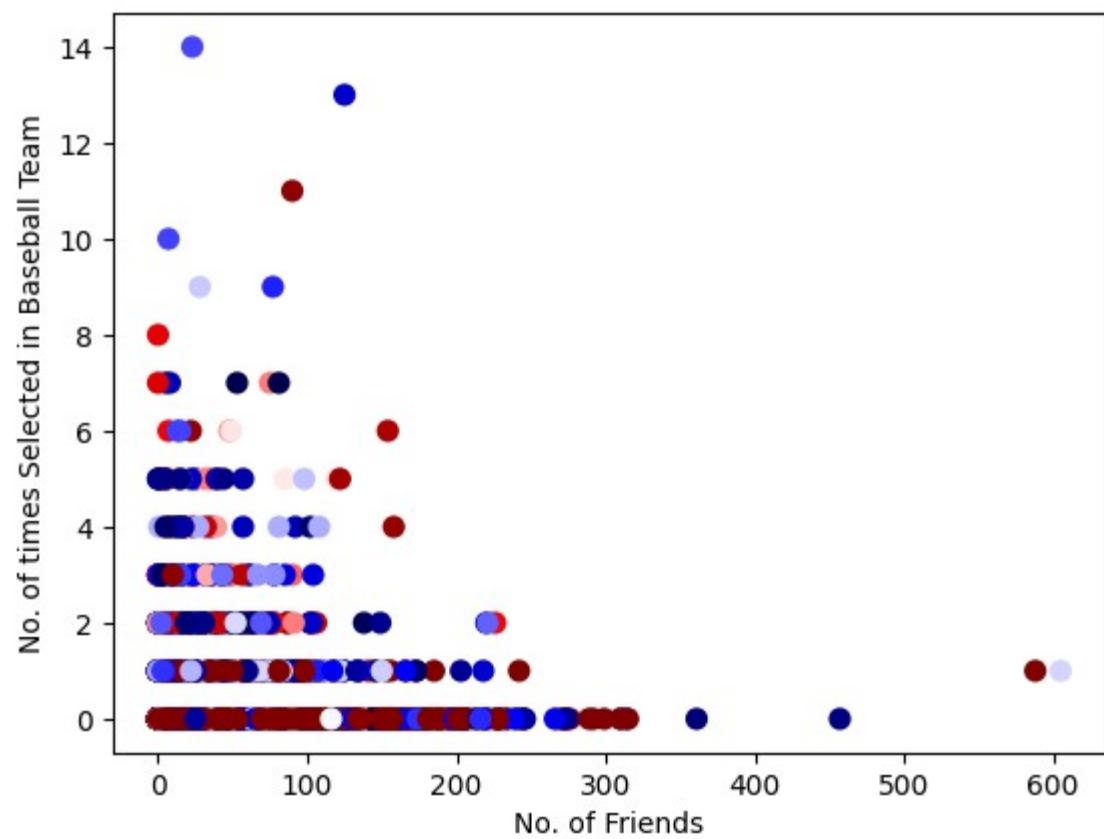
Social Circle vs Soccer Team selections



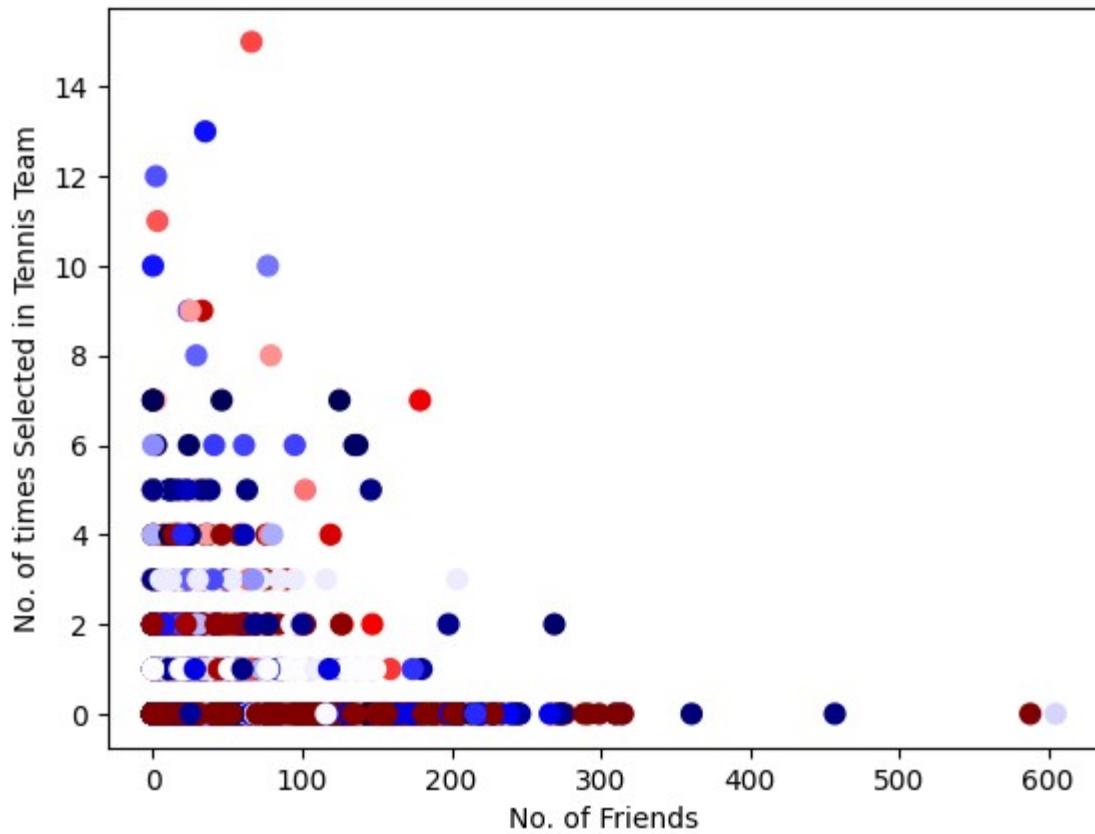
Social Circle vs Volleyball Team selections



Social Circle vs Baseball Team selections



Social Circle vs Tennis Team selections



For “Batch of 2007” student dataset:

Total no. points considered for clustering the 2007 Batch Students is : 3663

Total Number of Clusters for 2007 batch found with Agglomerative Hierarchical Clustering are : 368

Number of Points corresponding to cluster label '0' are : 4

Number of Points corresponding to cluster label '1' are : 2

Number of Points corresponding to cluster label '2' are : 2

Number of Points corresponding to cluster label '3' are : 2

Number of Points corresponding to cluster label '4' are : 2

Number of Points corresponding to cluster label '5' are : 3

Number of Points corresponding to cluster label '6' are : 2

Number of Points corresponding to cluster label '7' are : 2

Number of Points corresponding to cluster label '8' are : 2

Number of Points corresponding to cluster label '9' are : 3

Number of Points corresponding to cluster label '10' are : 2

Number of Points corresponding to cluster label '11' are : 2

Number of Points corresponding to cluster label '12' are : 3

Number of Points corresponding to cluster label '13' are : 2

Number of Points corresponding to cluster label '14' are : 2

Number of Points corresponding to cluster label '15' are : 3

Number of Points corresponding to cluster label '16' are : 10

Number of Points corresponding to cluster label '17' are : 2

Number of Points corresponding to cluster label '18' are : 3

Number of Points corresponding to cluster label '19' are : 8

Number of Points corresponding to cluster label '20' are : 2

Number of Points corresponding to cluster label '21' are : 2

Number of Points corresponding to cluster label '22' are : 2

Number of Points corresponding to cluster label '23' are : 4

Number of Points corresponding to cluster label '24' are : 2

Number of Points corresponding to cluster label '25' are : 3

Number of Points corresponding to cluster label '26' are : 2

Number of Points corresponding to cluster label '27' are : 1

Number of Points corresponding to cluster label '28' are : 3

Number of Points corresponding to cluster label '29' are : 5

Number of Points corresponding to cluster label '30' are : 2

Number of Points corresponding to cluster label '31' are : 2

Number of Points corresponding to cluster label '32' are : 2

Number of Points corresponding to cluster label '33' are : 2

Number of Points corresponding to cluster label '34' are : 5

Number of Points corresponding to cluster label '35' are : 9

Number of Points corresponding to cluster label '36' are : 5

Number of Points corresponding to cluster label '37' are : 2

Number of Points corresponding to cluster label '38' are : 3

Number of Points corresponding to cluster label '39' are : 2

Number of Points corresponding to cluster label '40' are : 24

Number of Points corresponding to cluster label '41' are : 9

Number of Points corresponding to cluster label '42' are : 7

Number of Points corresponding to cluster label '43' are : 2

Number of Points corresponding to cluster label '44' are : 39

Number of Points corresponding to cluster label '45' are : 2

Number of Points corresponding to cluster label '46' are : 1

Number of Points corresponding to cluster label '47' are : 1

Number of Points corresponding to cluster label '48' are : 1

Number of Points corresponding to cluster label '49' are : 2

Number of Points corresponding to cluster label '50' are : 1

Number of Points corresponding to cluster label '51' are : 1

Number of Points corresponding to cluster label '52' are : 2

Number of Points corresponding to cluster label '53' are : 2

Number of Points corresponding to cluster label '54' are : 3

Number of Points corresponding to cluster label '55' are : 1

Number of Points corresponding to cluster label '56' are : 1

Number of Points corresponding to cluster label '57' are : 4

Number of Points corresponding to cluster label '58' are : 6

Number of Points corresponding to cluster label '59' are : 3

Number of Points corresponding to cluster label '60' are : 8

Number of Points corresponding to cluster label '61' are : 2

Number of Points corresponding to cluster label '62' are : 7

Number of Points corresponding to cluster label '63' are : 1

Number of Points corresponding to cluster label '64' are : 1

Number of Points corresponding to cluster label '65' are : 2

Number of Points corresponding to cluster label '66' are : 2

Number of Points corresponding to cluster label '67' are : 1

Number of Points corresponding to cluster label '68' are : 3

Number of Points corresponding to cluster label '69' are : 8

Number of Points corresponding to cluster label '70' are : 10

Number of Points corresponding to cluster label '71' are : 1

Number of Points corresponding to cluster label '72' are : 2

Number of Points corresponding to cluster label '73' are : 3

Number of Points corresponding to cluster label '74' are : 2

Number of Points corresponding to cluster label '75' are : 2

Number of Points corresponding to cluster label '76' are : 6

Number of Points corresponding to cluster label '77' are : 16

Number of Points corresponding to cluster label '78' are : 8

Number of Points corresponding to cluster label '79' are : 1

Number of Points corresponding to cluster label '80' are : 5

Number of Points corresponding to cluster label '81' are : 1

Number of Points corresponding to cluster label '82' are : 3

Number of Points corresponding to cluster label '83' are : 1

Number of Points corresponding to cluster label '84' are : 14

Number of Points corresponding to cluster label '85' are : 12

Number of Points corresponding to cluster label '86' are : 7

Number of Points corresponding to cluster label '87' are : 20

Number of Points corresponding to cluster label '88' are : 10

Number of Points corresponding to cluster label '89' are : 189

Number of Points corresponding to cluster label '90' are : 152

Number of Points corresponding to cluster label '91' are : 2100

Number of Points corresponding to cluster label '92' are : 2

Number of Points corresponding to cluster label '93' are : 1

Number of Points corresponding to cluster label '94' are : 1

Number of Points corresponding to cluster label '95' are : 1

Number of Points corresponding to cluster label '96' are : 1

Number of Points corresponding to cluster label '97' are : 1

Number of Points corresponding to cluster label '98' are : 1

Number of Points corresponding to cluster label '99' are : 1

Number of Points corresponding to cluster label '100' are : 2

Number of Points corresponding to cluster label '101' are : 1

Number of Points corresponding to cluster label '102' are : 1

Number of Points corresponding to cluster label '103' are : 1

Number of Points corresponding to cluster label '104' are : 1

Number of Points corresponding to cluster label '105' are : 1

Number of Points corresponding to cluster label '106' are : 1

Number of Points corresponding to cluster label '107' are : 1

Number of Points corresponding to cluster label '108' are : 2

Number of Points corresponding to cluster label '109' are : 1

Number of Points corresponding to cluster label '110' are : 3

Number of Points corresponding to cluster label '111' are : 1

Number of Points corresponding to cluster label '112' are : 1

Number of Points corresponding to cluster label '113' are : 1

Number of Points corresponding to cluster label '114' are : 1

Number of Points corresponding to cluster label '115' are : 1

Number of Points corresponding to cluster label '116' are : 1

Number of Points corresponding to cluster label '117' are : 1

Number of Points corresponding to cluster label '118' are : 1

Number of Points corresponding to cluster label '119' are : 1

Number of Points corresponding to cluster label '120' are : 1

Number of Points corresponding to cluster label '121' are : 1

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Number of Points corresponding to cluster label '130' are : 1

Number of Points corresponding to cluster label '131' are : 1

Number of Points corresponding to cluster label '132' are : 2

Number of Points corresponding to cluster label '133' are : 5

Number of Points corresponding to cluster label '134' are : 3

Number of Points corresponding to cluster label '135' are : 1

Number of Points corresponding to cluster label '136' are : 1

Number of Points corresponding to cluster label '137' are : 1

Number of Points corresponding to cluster label '138' are : 6

Number of Points corresponding to cluster label '139' are : 1

Number of Points corresponding to cluster label '140' are : 2

Number of Points corresponding to cluster label '141' are : 1

Number of Points corresponding to cluster label '142' are : 1

Number of Points corresponding to cluster label '143' are : 1

Number of Points corresponding to cluster label '144' are : 1

Number of Points corresponding to cluster label '145' are : 1

Number of Points corresponding to cluster label '146' are : 3

Number of Points corresponding to cluster label '147' are : 1

Number of Points corresponding to cluster label '148' are : 13

Number of Points corresponding to cluster label '149' are : 7

Number of Points corresponding to cluster label '150' are : 2

Number of Points corresponding to cluster label '151' are : 1

Number of Points corresponding to cluster label '152' are : 1

Number of Points corresponding to cluster label '153' are : 3

Number of Points corresponding to cluster label '154' are : 2

Number of Points corresponding to cluster label '155' are : 1

Number of Points corresponding to cluster label '156' are : 1

Number of Points corresponding to cluster label '157' are : 2

Number of Points corresponding to cluster label '158' are : 3

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Number of Points corresponding to cluster label '182' are : 46

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Number of Points corresponding to cluster label '186' are : 1

Number of Points corresponding to cluster label '187' are : 1

Number of Points corresponding to cluster label '188' are : 1

Number of Points corresponding to cluster label '189' are : 1

Number of Points corresponding to cluster label '190' are : 1

Number of Points corresponding to cluster label '191' are : 1

Number of Points corresponding to cluster label '192' are : 1

Number of Points corresponding to cluster label '193' are : 1

Number of Points corresponding to cluster label '194' are : 1

Number of Points corresponding to cluster label '195' are : 1

Number of Points corresponding to cluster label '196' are : 1

Number of Points corresponding to cluster label '197' are : 1

Number of Points corresponding to cluster label '198' are : 1

Number of Points corresponding to cluster label '199' are : 1

Number of Points corresponding to cluster label '200' are : 1

Number of Points corresponding to cluster label '201' are : 1

Number of Points corresponding to cluster label '202' are : 1

Number of Points corresponding to cluster label '203' are : 1

Number of Points corresponding to cluster label '204' are : 1

Number of Points corresponding to cluster label '205' are : 1

Number of Points corresponding to cluster label '206' are : 1

Number of Points corresponding to cluster label '207' are : 1

Number of Points corresponding to cluster label '208' are : 1

Number of Points corresponding to cluster label '209' are : 1

Number of Points corresponding to cluster label '210' are : 1

Number of Points corresponding to cluster label '211' are : 1

Number of Points corresponding to cluster label '212' are : 1

Number of Points corresponding to cluster label '213' are : 1

Number of Points corresponding to cluster label '214' are : 1

Number of Points corresponding to cluster label '215' are : 1

Number of Points corresponding to cluster label '216' are : 1

Number of Points corresponding to cluster label '217' are : 1

Number of Points corresponding to cluster label '218' are : 1

Number of Points corresponding to cluster label '219' are : 1

Number of Points corresponding to cluster label '220' are : 1

Number of Points corresponding to cluster label '221' are : 1

Number of Points corresponding to cluster label '222' are : 2

Number of Points corresponding to cluster label '223' are : 1

Number of Points corresponding to cluster label '224' are : 1

Number of Points corresponding to cluster label '225' are : 1

Number of Points corresponding to cluster label '226' are : 1

Number of Points corresponding to cluster label '227' are : 1

Number of Points corresponding to cluster label '228' are : 1

Number of Points corresponding to cluster label '229' are : 1

Number of Points corresponding to cluster label '230' are : 1

Number of Points corresponding to cluster label '231' are : 1

Number of Points corresponding to cluster label '232' are : 1

Number of Points corresponding to cluster label '233' are : 1

Number of Points corresponding to cluster label '234' are : 1

Number of Points corresponding to cluster label '235' are : 1

Number of Points corresponding to cluster label '236' are : 1

Number of Points corresponding to cluster label '237' are : 1

Number of Points corresponding to cluster label '238' are : 1

Number of Points corresponding to cluster label '239' are : 1

Number of Points corresponding to cluster label '240' are : 1

Number of Points corresponding to cluster label '241' are : 1

Number of Points corresponding to cluster label '242' are : 1

Number of Points corresponding to cluster label '243' are : 1

Number of Points corresponding to cluster label '244' are : 1

Number of Points corresponding to cluster label '245' are : 1

Number of Points corresponding to cluster label '246' are : 2

Number of Points corresponding to cluster label '247' are : 1

Number of Points corresponding to cluster label '248' are : 1

Number of Points corresponding to cluster label '249' are : 1

Number of Points corresponding to cluster label '250' are : 6

Number of Points corresponding to cluster label '251' are : 1

Number of Points corresponding to cluster label '252' are : 1

Number of Points corresponding to cluster label '253' are : 1

Number of Points corresponding to cluster label '254' are : 1

Number of Points corresponding to cluster label '255' are : 1

Number of Points corresponding to cluster label '256' are : 1

Number of Points corresponding to cluster label '257' are : 1

Number of Points corresponding to cluster label '258' are : 1

Number of Points corresponding to cluster label '259' are : 1

Number of Points corresponding to cluster label '260' are : 1

Number of Points corresponding to cluster label '261' are : 1

Number of Points corresponding to cluster label '262' are : 1

Number of Points corresponding to cluster label '263' are : 1

Number of Points corresponding to cluster label '264' are : 1

Number of Points corresponding to cluster label '265' are : 1

Number of Points corresponding to cluster label '266' are : 1

Number of Points corresponding to cluster label '267' are : 1

Number of Points corresponding to cluster label '268' are : 1

Number of Points corresponding to cluster label '269' are : 1

Number of Points corresponding to cluster label '270' are : 3

Number of Points corresponding to cluster label '271' are : 1

Number of Points corresponding to cluster label '272' are : 1

Number of Points corresponding to cluster label '273' are : 1

Number of Points corresponding to cluster label '274' are : 1

Number of Points corresponding to cluster label '275' are : 1

Number of Points corresponding to cluster label '276' are : 1

Number of Points corresponding to cluster label '277' are : 1

Number of Points corresponding to cluster label '278' are : 1

Number of Points corresponding to cluster label '279' are : 1

Number of Points corresponding to cluster label '280' are : 1

Number of Points corresponding to cluster label '281' are : 1

Number of Points corresponding to cluster label '282' are : 2

Number of Points corresponding to cluster label '283' are : 1

Number of Points corresponding to cluster label '284' are : 1

Number of Points corresponding to cluster label '285' are : 1

Number of Points corresponding to cluster label '286' are : 1

Number of Points corresponding to cluster label '287' are : 1

Number of Points corresponding to cluster label '288' are : 1

Number of Points corresponding to cluster label '289' are : 1

Number of Points corresponding to cluster label '290' are : 1

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Number of Points corresponding to cluster label '294' are : 1

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Number of Points corresponding to cluster label '298' are : 2

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Number of Points corresponding to cluster label '300' are : 1

Number of Points corresponding to cluster label '301' are : 1

Number of Points corresponding to cluster label '302' are : 2

Number of Points corresponding to cluster label '303' are : 1

Number of Points corresponding to cluster label '304' are : 1

Number of Points corresponding to cluster label '305' are : 1

Number of Points corresponding to cluster label '306' are : 1

Number of Points corresponding to cluster label '307' are : 1

Number of Points corresponding to cluster label '308' are : 1

Number of Points corresponding to cluster label '309' are : 1

Number of Points corresponding to cluster label '310' are : 5

Number of Points corresponding to cluster label '311' are : 1

Number of Points corresponding to cluster label '312' are : 1

Number of Points corresponding to cluster label '313' are : 1

Number of Points corresponding to cluster label '314' are : 1

Number of Points corresponding to cluster label '315' are : 1

Number of Points corresponding to cluster label '316' are : 1

Number of Points corresponding to cluster label '317' are : 1

Number of Points corresponding to cluster label '318' are : 2

Number of Points corresponding to cluster label '319' are : 1

Number of Points corresponding to cluster label '320' are : 1

Number of Points corresponding to cluster label '321' are : 1

Number of Points corresponding to cluster label '322' are : 1

Number of Points corresponding to cluster label '323' are : 1

Number of Points corresponding to cluster label '324' are : 1

Number of Points corresponding to cluster label '325' are : 1

Number of Points corresponding to cluster label '326' are : 1

Number of Points corresponding to cluster label '327' are : 1

Number of Points corresponding to cluster label '328' are : 1

Number of Points corresponding to cluster label '329' are : 1

Number of Points corresponding to cluster label '330' are : 1

Number of Points corresponding to cluster label '331' are : 1

Number of Points corresponding to cluster label '332' are : 1

Number of Points corresponding to cluster label '333' are : 1

Number of Points corresponding to cluster label '334' are : 52

Number of Points corresponding to cluster label '335' are : 1

Number of Points corresponding to cluster label '336' are : 1

Number of Points corresponding to cluster label '337' are : 1

Number of Points corresponding to cluster label '338' are : 1

Number of Points corresponding to cluster label '339' are : 1

Number of Points corresponding to cluster label '340' are : 1

Number of Points corresponding to cluster label '341' are : 1

Number of Points corresponding to cluster label '342' are : 8

Number of Points corresponding to cluster label '343' are : 1

Number of Points corresponding to cluster label '344' are : 1

Number of Points corresponding to cluster label '345' are : 1

Number of Points corresponding to cluster label '346' are : 10

Number of Points corresponding to cluster label '347' are : 1

Number of Points corresponding to cluster label '348' are : 1

Number of Points corresponding to cluster label '349' are : 1

Number of Points corresponding to cluster label '350' are : 5

Number of Points corresponding to cluster label '351' are : 1

Number of Points corresponding to cluster label '352' are : 1

Number of Points corresponding to cluster label '353' are : 1

Number of Points corresponding to cluster label '354' are : 33

Number of Points corresponding to cluster label '355' are : 1

Number of Points corresponding to cluster label '356' are : 1

Number of Points corresponding to cluster label '357' are : 1

Number of Points corresponding to cluster label '358' are : 3

Number of Points corresponding to cluster label '359' are : 1

Number of Points corresponding to cluster label '360' are : 1

Number of Points corresponding to cluster label '361' are : 1

Number of Points corresponding to cluster label '362' are : 41

Number of Points corresponding to cluster label '363' are : 1

Number of Points corresponding to cluster label '364' are : 1

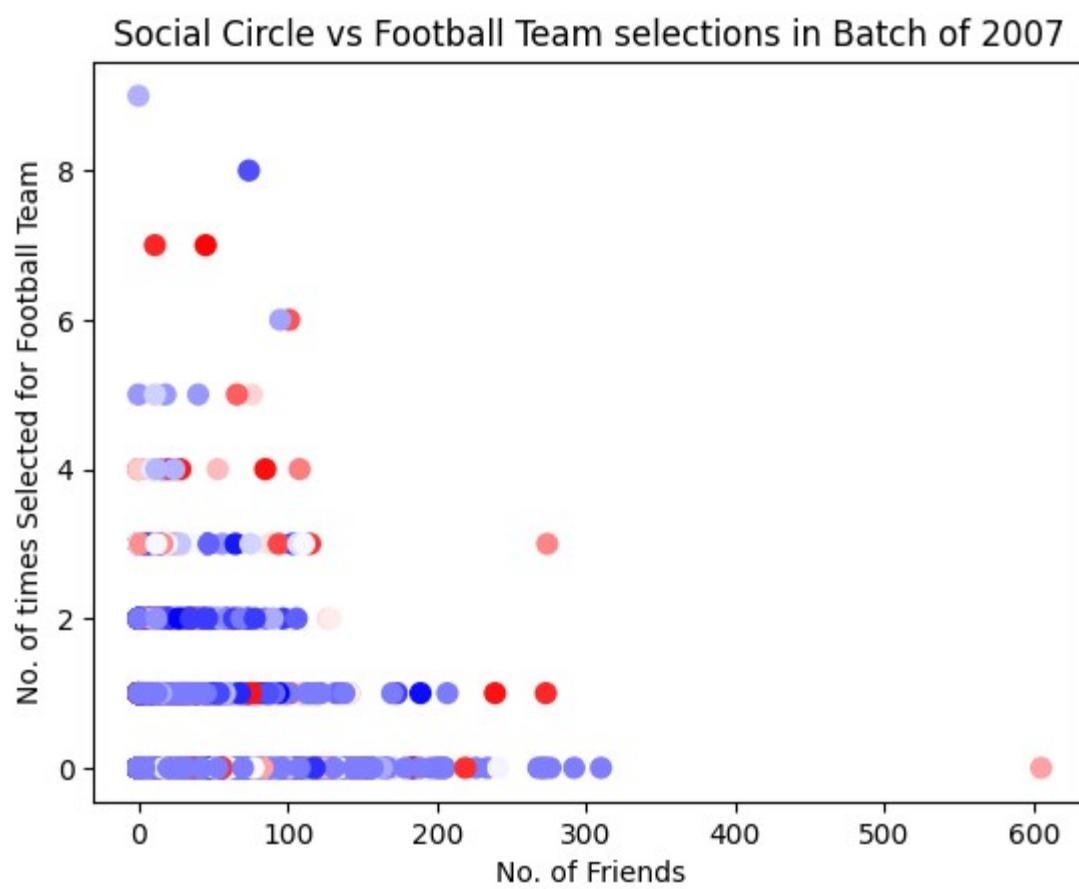
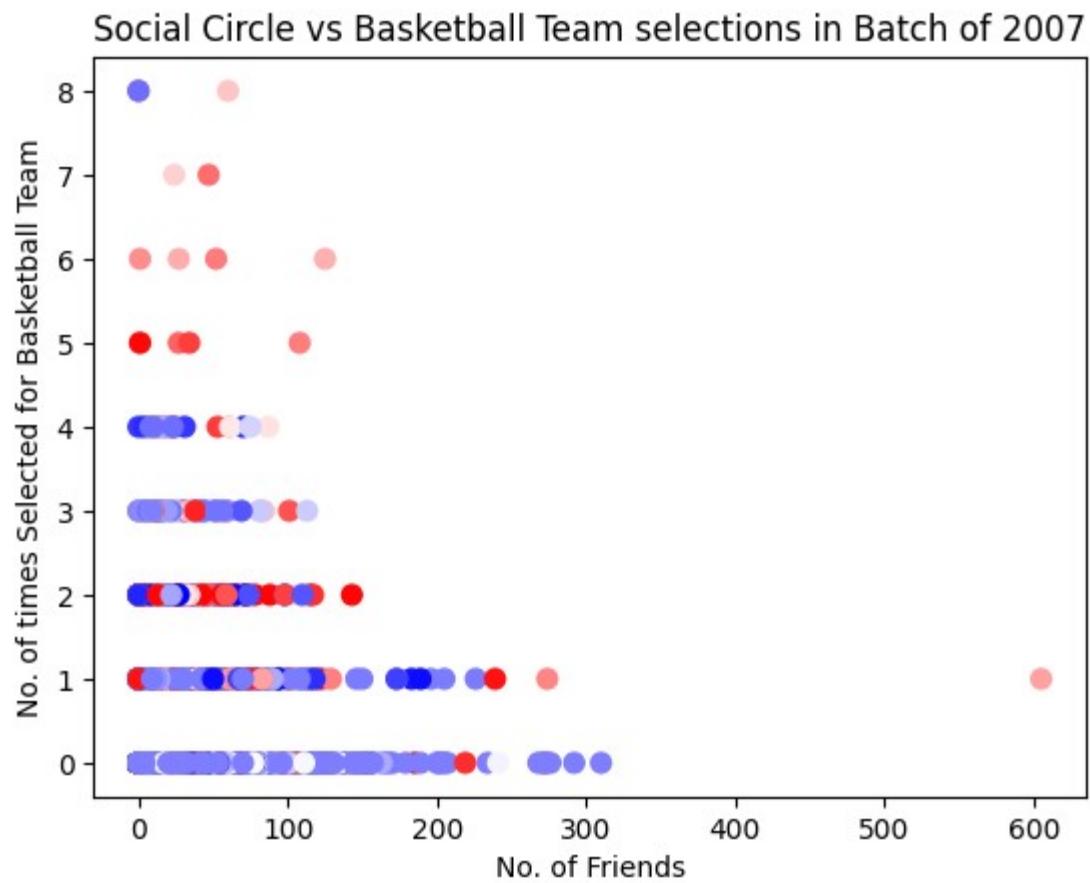
Number of Points corresponding to cluster label '365' are : 1

Number of Points corresponding to cluster label '366' are : 39

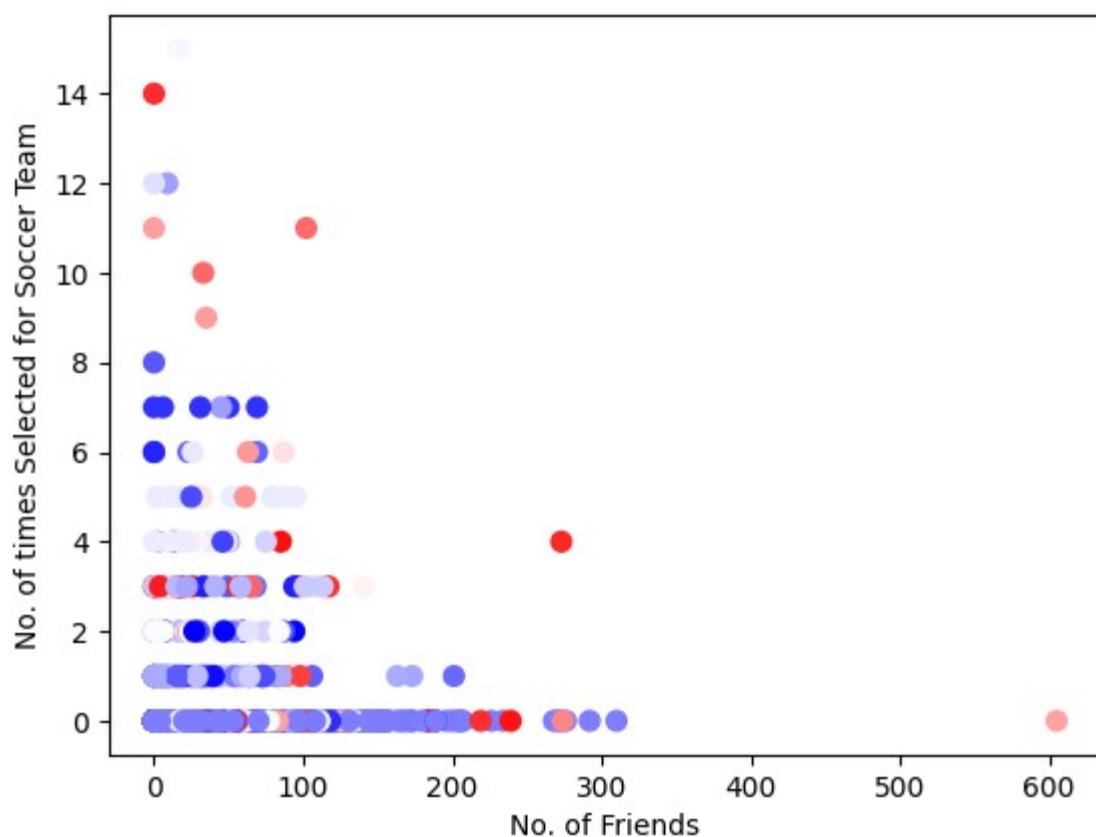
Number of Points corresponding to cluster label '367' are : 1

ALL POINTS HAVE BEEN SUCCESSFULLY PARTITIONED FOR 2007 BATCH

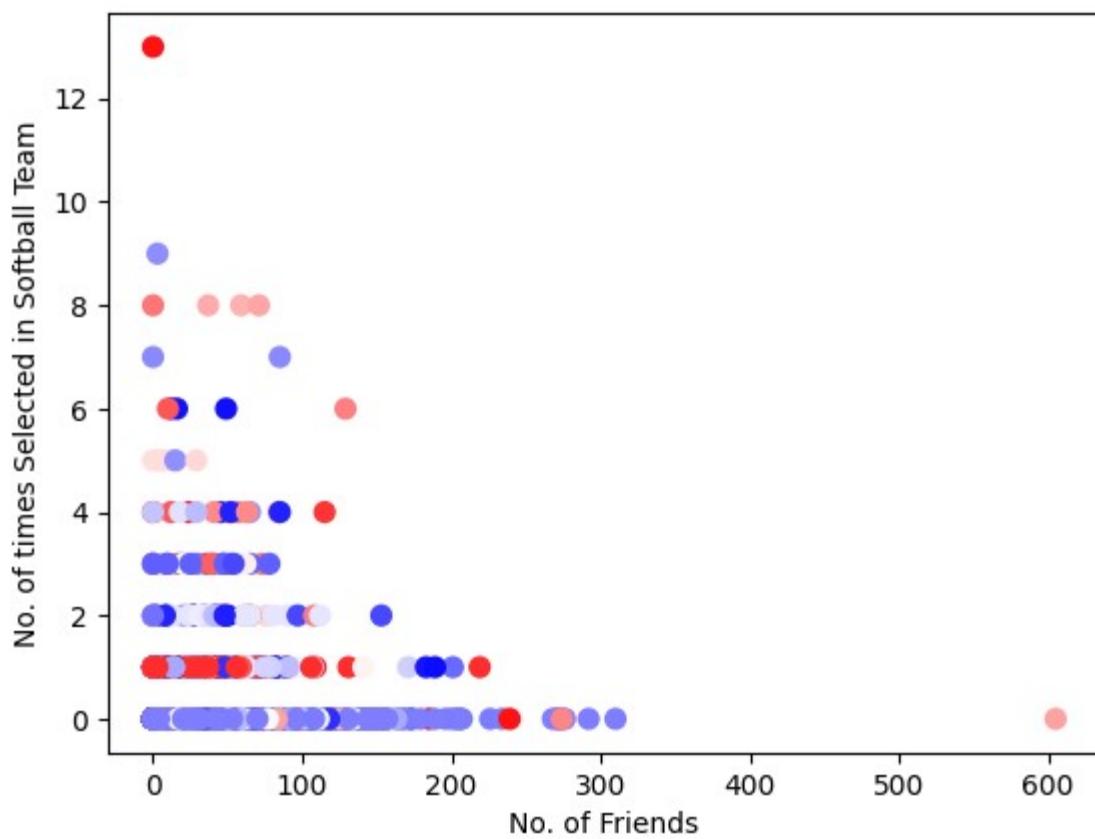
**Silhouette score of the complete partitioning done for only 'Batch of 2007' -
Students is : 0.933933933933934**



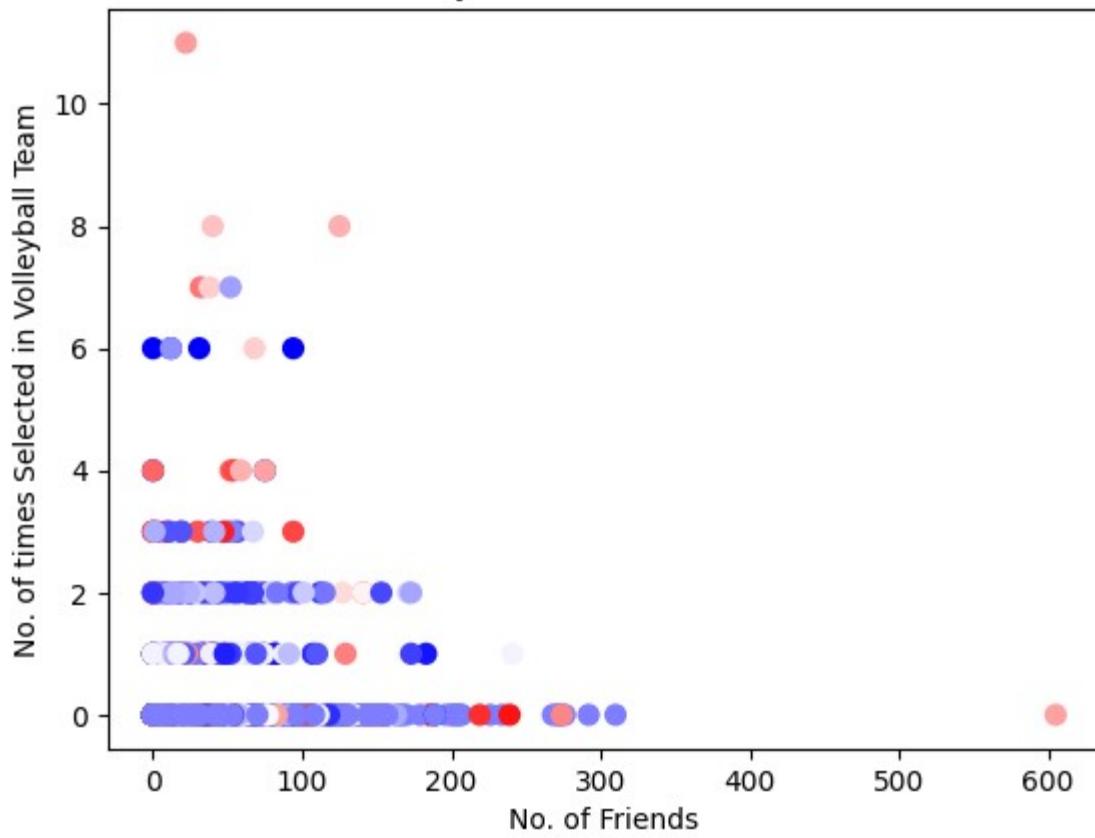
Social Circle vs Soccer Team selections in Batch of 2007



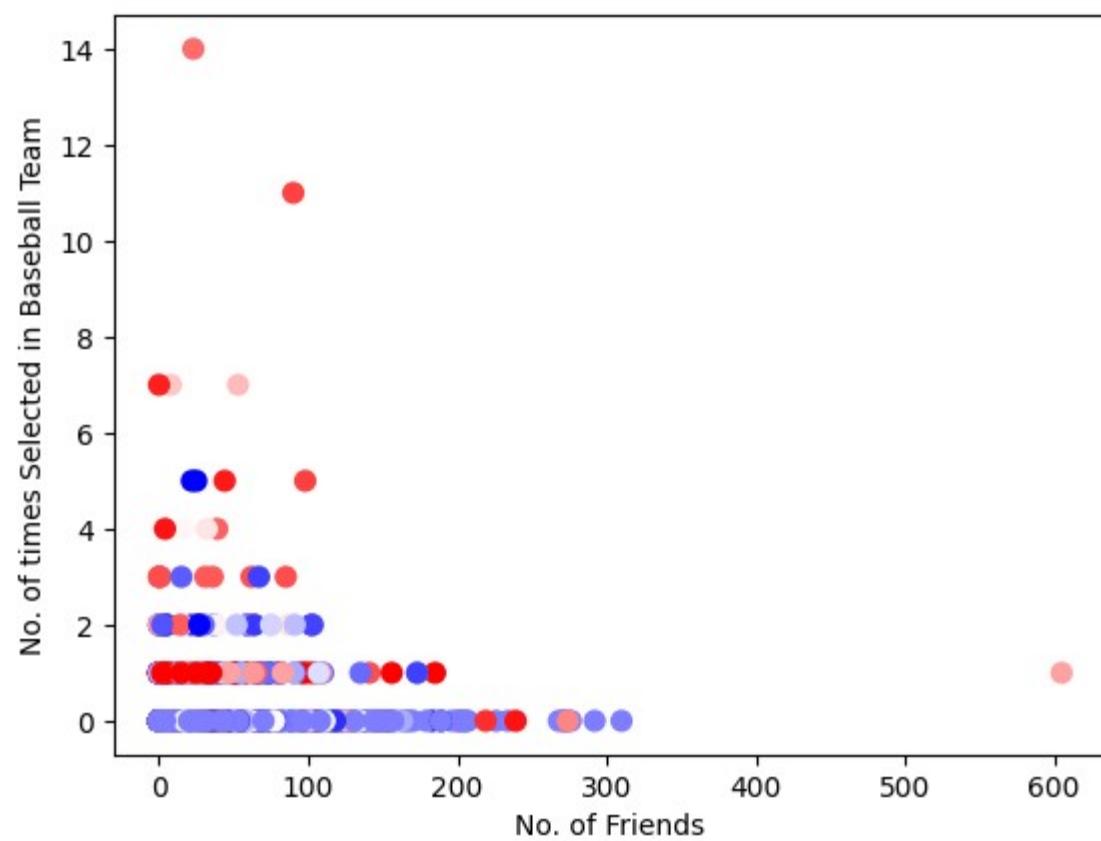
Social Circle vs Softball Team selections in Batch of 2007



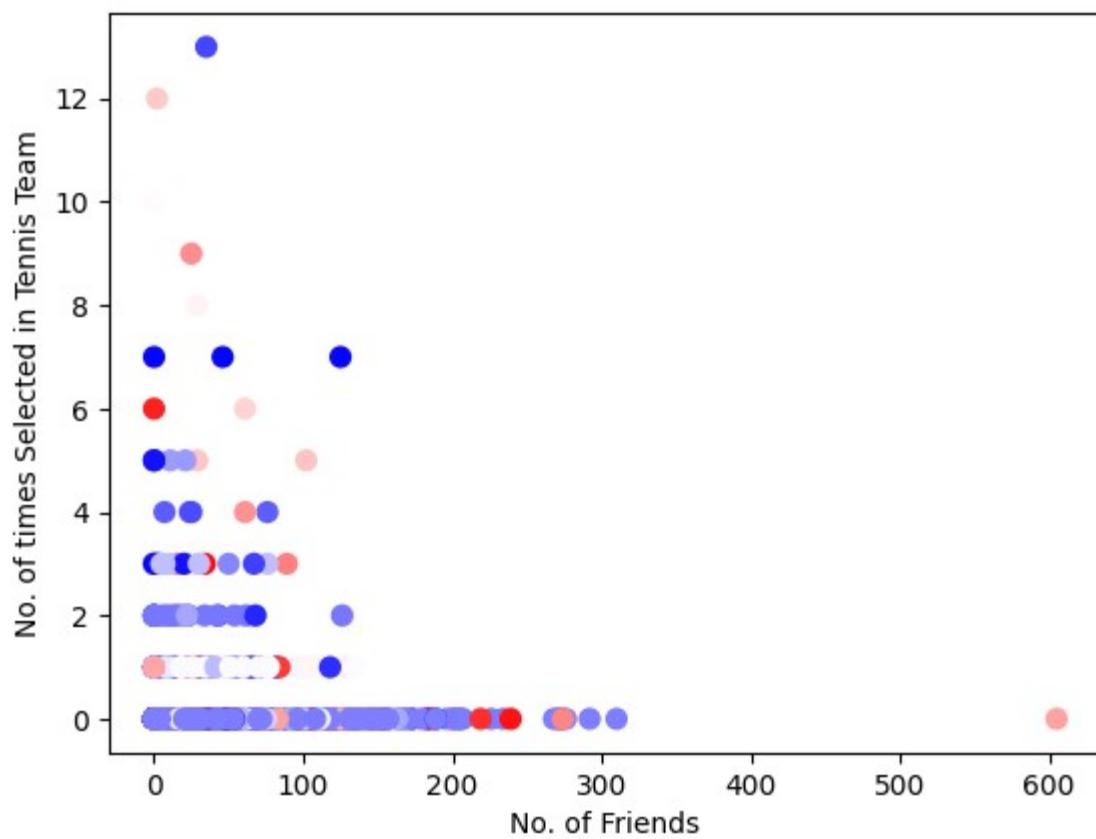
Social Circle vs Volleyball Team selections in Batch of 2007



Social Circle vs Baseball Team selections in Batch of 2007



Social Circle vs Tennis Team selections in Batch of 2007



Chapter 4: Consolidated Outputs in Tabular Form

Please find the tables with details regarding outputs in tabular form for quick reference!

Clustering Method	Parameters	No. of Rows removed from Student Dataset due to presence of 'Null' items	Total No. of Columns Features remaining in the Student Dataset after Data Cleaning and Exploratory data Analysis	Total No. of Rows remaining in Student Dataset (Based after Data Cleaning and Exploratory Data Analysis)	Feature Selection Criteria	No. of features selected	Features selected for Clustering	Total Number of Clusters	Average Silhouette Score of the Final Partitioning	
Density Based Spatial Clustering for Applications	Eps = 0.5, Minpts = 5	2 [e.g. gender]	26	3	1674	[Max. Inseparable Features] 0 [Features_with_Variance < 1]	?	"Basketball", "Football", "Soccer", "Football", "Volleyball", "Baseball", "Tennis"	133	0.052
Agglomerative Hierarchical Clustering with Distance_threshold = 1	n_clusters=Name, linkage='single', distance_threshold=1	2 [e.g. gender]	26	3	1674	[Max. Inseparable Features] 0 [Features_with_Variance < 1]	?	"Basketball", "Football", "Soccer", "Football", "Volleyball", "Baseball", "Tennis"	1054	0.052

Clustering Method	Parameters	Total no. of Rows remaining in "2007_Batch" Dataset after Data Cleaning and Exploratory data Analysis	Feature Selection Criteria	No. of features selected	Features selected for Clustering	Total Number of Clusters	Average Silhouette Score of the Final Partitioning
Density Based Spatial Clustering for Applications	Eps = 0.5, Minpts = 5	38	363	[[Most_Interpretable_Features], 0 [Features_with_Variance < 1]]	"Basketball", "Football", "Soccer", "Volleyball", "Baseball", "Tennis"	52	0.819
Agglomerative Hierarchical Clustering with Threshold on Distance	n_clusters=3, linkage='single', distance_threshold=1	38	363	[[Most_Interpretable_Features], 0 [Features_with_Variance < 1]]	"Basketball", "Football", "Soccer", "Volleyball", "Baseball", "Tennis"	368	0.939