JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

# Analysis on Modern Day Relationship Breakups & their effects on Mental Health

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***Abstract:***

Overview: Relationships (Romantic i.e., involving Love) are emerging drastically as the population persist to increase however, with increasing relationships there exists a parallel running entity of breakups with whatever maybe the reason. Our aim is to analyse the same and find whether it has any psychological effect on either of the involved person.

Methodology: It included collection of data using online method, "Google Forms" particularly which consisted questionnaire of 54 romance related and hypothetical questions which helped find one's perspective towards relationships. Conducted Descriptive data analysis on the data gathered from the questionnaire.

Result: Responses recorded were 170, 84 (49%) were divorced and remaining 86 (51%) were married. Classification of males & females were again 84 & 86 respectively. Ages of the sample were from 20 to 63. XGBoost technique was used to classify as it is an ensemble learning technique which helped to find out the important factors that has an effect. Accordingly, nett 5 features were found to be dominantly affecting.

Conclusion: The exact intensity i.e., the threshold of the features (questions) cannot be determined as they have different existence in different tree however following are the observed conclusions:

Feature 18 (f18) < 1.5 i.e., rating 0 or 1 will be an ultimatum of unhealthy relationship.

Similarly, if f8 < 1.5, f0 < 2, f2 < 3 and f1 < 2.5 will follow the pattern of unhealthy relationship.

***Keywords:***

*Feature, Relationships, Breakups, Marriage, Divorced, Mental Health*

## 1. Introduction

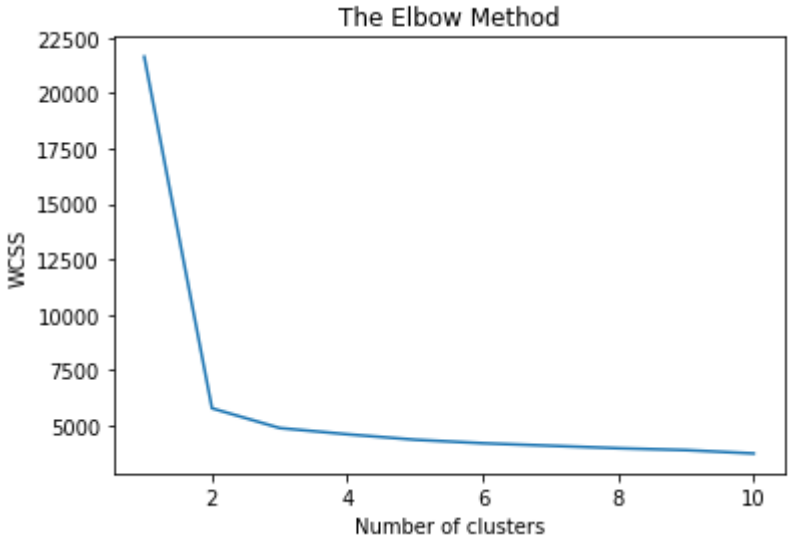
It is found that modern day relationships have been very common however, necessarily not last longer. Also, this problem persists to grow, typically in the age group of 20 – 60 and is also found to be a possible cause for mental health issues in the same age group. End in a romantic relationship consisting of mental and physical attachment can be considered a major life event which has an end result of imbalance in emotional sense of a normal human being thereby causing mental health issues. A study cited that breakups happened in distant past have less effect on an individual than the one happened recently. We found it as a necessity to find the reasons/probable reasons that cause these breakups ultimately stating of what specific things one should not do while in a relationship in order to prevent the shattering of same by using machine learning and looking towards it with a statistical overview.

## 2. Methodology

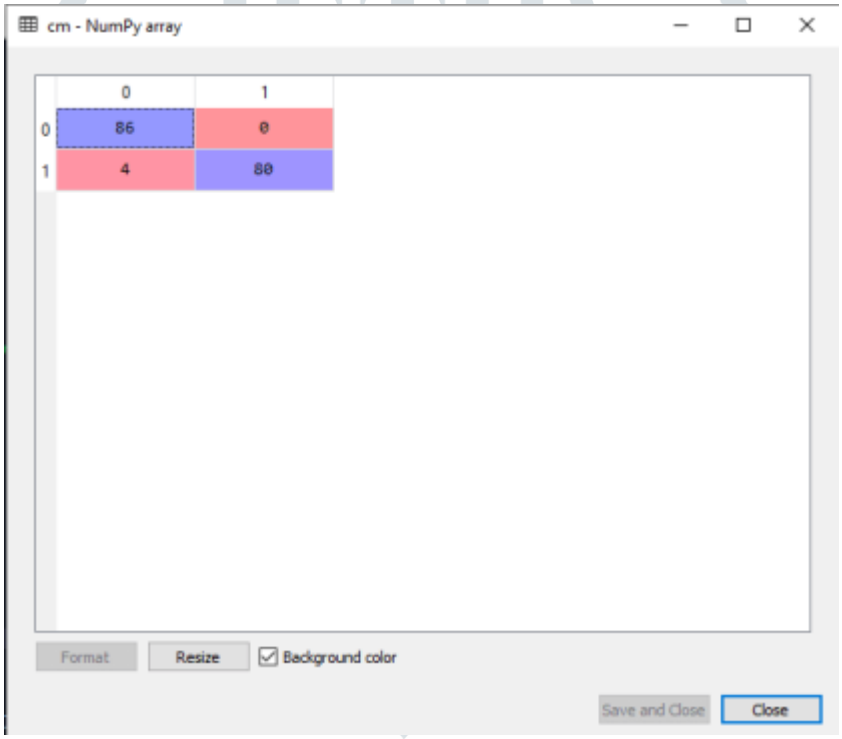
2.1 In order to find the probable causes with an exact percentage of existence it was necessary to collect the data, a questionnaire with structured format of ratings from 0 to 4 with ascending order of intensity was designed and floated amongst sample of 170 individuals using WhatsApp. The sample consisted individuals of ages 20 to 63 and of married and divorced category. The questionnaire consisted a total of 54 questions in order to define one's overview towards their partner and relationship.

2.2 The data was collected into (.csv) Comma Separated Values format. In order to find out the Percentage/Number of individuals Divorced or in a Healthy relationship i.e., in order to distinguish we applied Clustering algorithm K-Means

clustering particularly. Using Elbow Method we plotted the clusters, and were able to distinguish 2 types. The plotted graph is as follows:



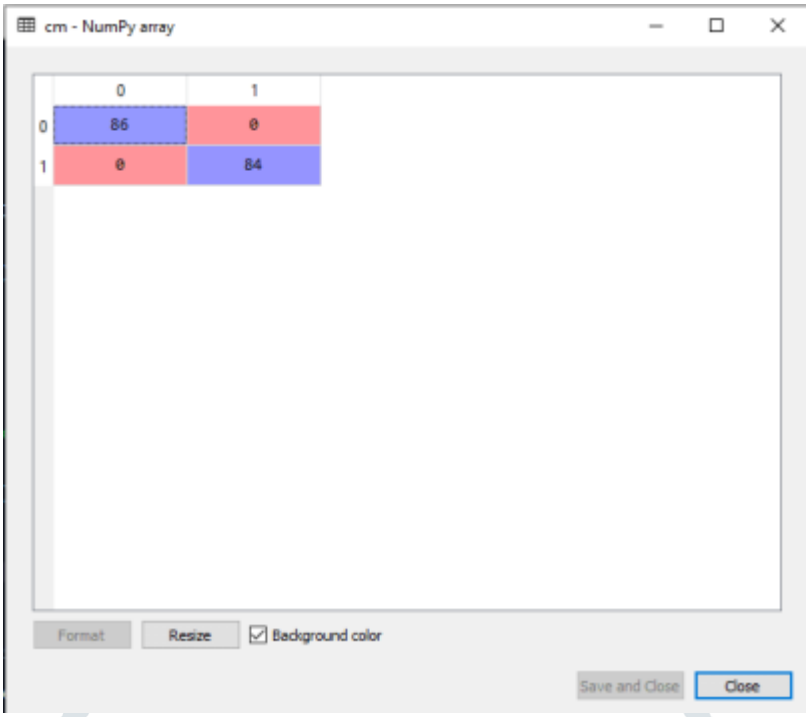

2.3 In order to find the accuracy of plotting we used confusion matrix to compare and evaluate how good the and aligned the clustering went. The results from comparison are as follows:




The results found are around 97.6% accurate.

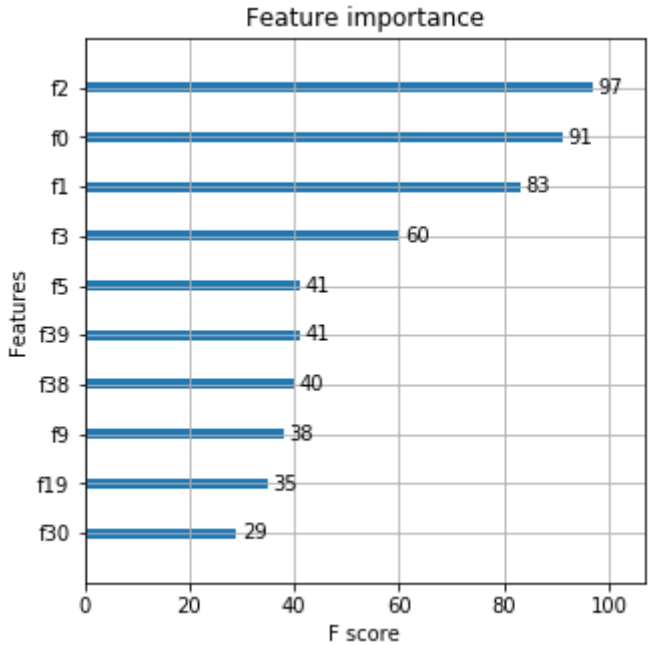
2.4 We used XGBoost to classify in-order to find the factors which are involved in particular as an important factor in decision making of whether the relationship is healthy or not. We created a XGBoost Classifier which will create 100 trees of maximum depth 8, with 0.8 and 0.7 fraction of rows and columns respectively for making each tree randomly.

2.5 Upon testing the model, we got the results as follows (in form of confusion matrix):

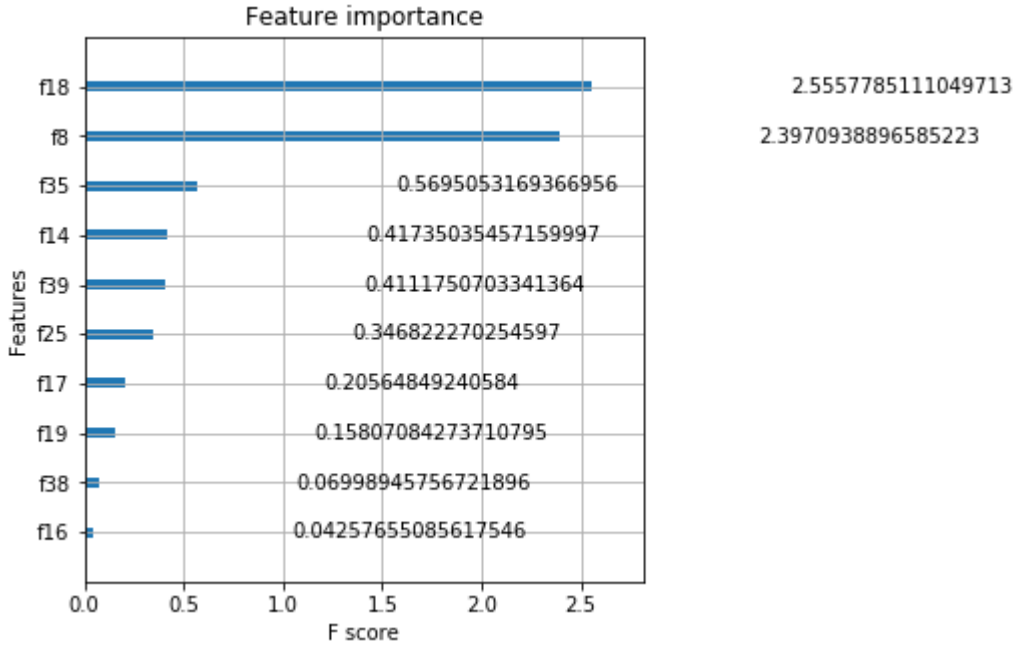



2.6 Later in the process we found the factors/features that resulted in influencing the state of relationship with respect to "Weights", "Cover", "Gain" where:
Weights = Number of times the feature was concerned when the data was split across all the trees.
Cover = Measures the quantity of observations concerned by the feature relatively.
Gain = Improvement in the accuracy brought by the feature to the branches of tree associated to it.
The plotting of Weight, Cover and Gain are as follows:

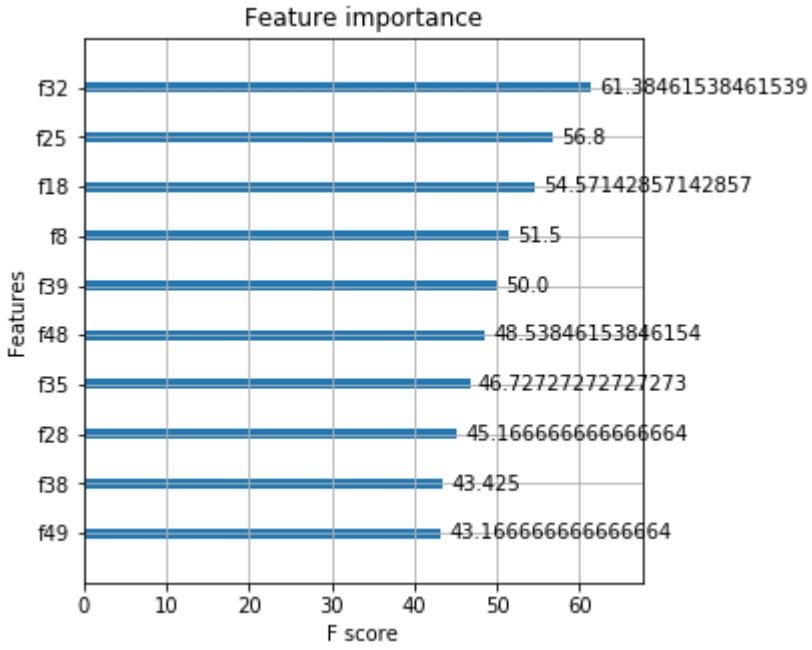
Weight:



Gain:



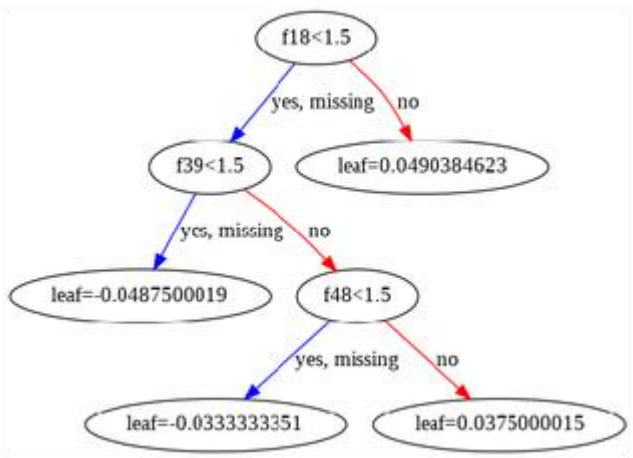

Cover:



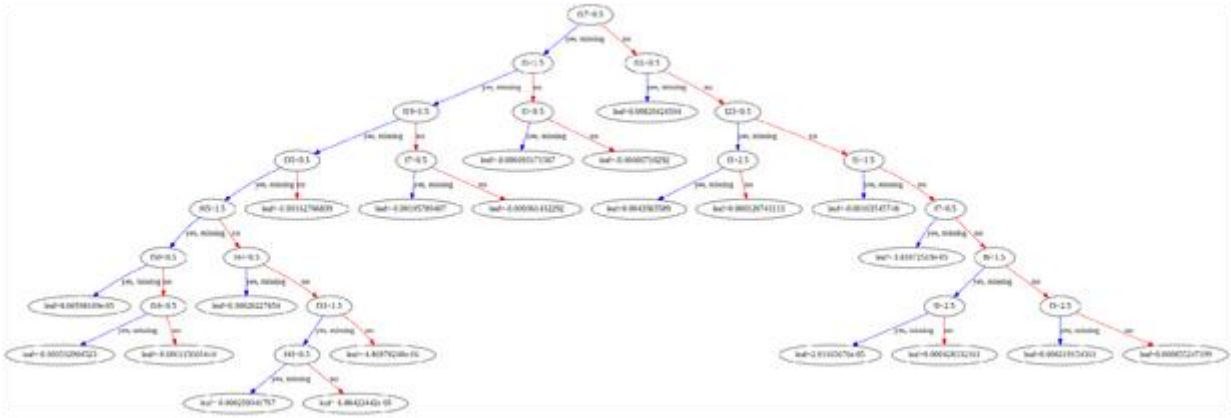

2.7 Weight is the general importance of the feature as of the repeated frequency is considered however the combination of gain and cover played the important role.

2.8 In order to determine the significance of a particular feature and get the statistical overview we visualized decision trees.

a. The first was at 0:



b. The second was at 45:



c. The third was at 99:

**3. Results:**

3.1 According to the plotting the features/factors f18 and f8 results in the increasing accuracy in a recognizable amount whenever they exist in a tree, also they had ample amount of coverage, ranking 3rd and 4th.

3.2 When considered weights top 3 features have major significance than rest.

3.3 Combining all of the above features we ended up with nett 5 influencing factors/features namely: F18, F8, F0, F2 and F1

3.4 The questions corresponding to features are:

a. You are like minded about an ideal marriage (Rate from 0 to 4 with 0 being least probable and 4 being most)?
b. You are not like family at home (Rate from 0 to 4 with 0 being least probable and 4 being most)?
c. After one of you accepts the mistake, the discussion ends (Rate from 0 to 4 with 0 being least probable and 4 being most)?
d. When the discussion/differences go in a different direction you can restart and correct it (Rate from 0 to 4 with 0 being least probable and 4 being most)?
e. You as a couple can keep your differences aside during tough times (Rate from 0 to 4 with 0 being least probable and 4 being most)?

3.5 The questions mentioned above can be interpreted as the reasons why breakups mostly happen with the statistical overview with respect to features following:

Feature 18 (f18) < 1.5 i.e., rating 0 or 1 will be an ultimatum of unhealthy relationship.

Similarly, if f8 < 1.5, f0 < 2, f2 < 3 and f1 < 2.5 will follow the pattern of unhealthy relationship.