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INFLUENCE MAXIMIZATION IN SOCIAL MEDIA WITH BIASED RENOVATE K-MEAN CLUSTERING AND BIASED BAT ALGORITHM

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ABSTRACT

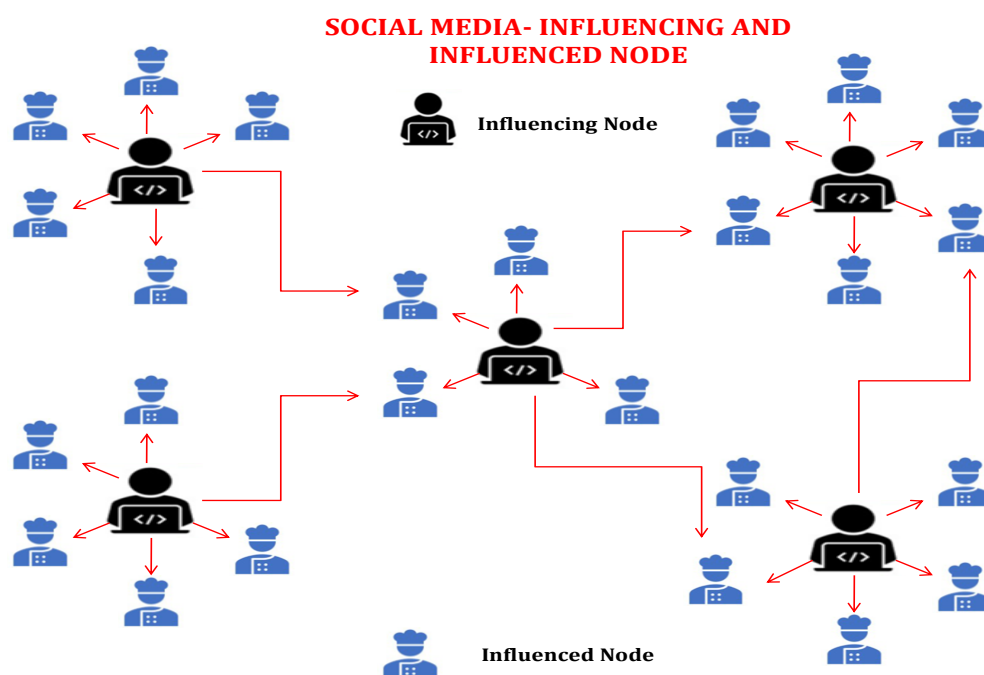
Social media has become an indispensable part of our everyday lives in the current digital age. These digital platforms are essential for information sharing, communication, and building meaningful relationships. Information dissemination in these social networks has become a major concern for many industries, including marketing, banking, politics, research, and education. Various models have been used to illustrate the dynamics of information sharing in these kinds of networks. Still, the concept of influence is extremely important for people and companies alike. Because influence maximization has the ability to reach and effect a large audience, it has received a lot of attention, especially in the context of social networks. This complex issue is sometimes described as the "influence maximization problem." This research presents a novel method to improve influence maximization by utilizing the Biased Bat Algorithm. Maximizing influence is a crucial problem in network analysis, which is frequently done in social networks. Influence can be compared to a cascade effect, in which a small number of people's activities set off a series of events that eventually affect a big chunk of the network. Finding these "influencers" is essential for effective resource distribution and knowledge sharing. Selecting the best vertex in the graph out of all the vertices is one of the key steps in determining the highest influence. This research presents a new method to find the maximum influence in social networks based on the Biased Bat algorithm. The proposed method aims to find the maximum influence in the social network graph that has a good fitness degree. The algorithm can identify potential influencers. Our simulations across multiple networks have unequivocally showcased the superiority of this algorithm as the preeminent and scalable solution to the influence maximization problem. The experimental outcomes clearly delineate that the employment of the MFA (Maximal First Activation) approach effectively diminishes the execution time required to approximate the maximum influence.

Keywords: Biased Clustering, Biased Bat Algorithm, Feature Selection, Improved Extra Tree Classifier Renovate K-Means Clustering

INTRODUCTION

The current era's methods of communication and information sharing have been significantly impacted by the recent growth of social networks and other online platforms. People with similar goals, values, and interests may connect and engage with one other through online social networks, which are dynamic, living ecosystems. They serve as more than just places for communication. The tendency for people to form relationships with those who are

similar to themselves, or homophily, is one essential aspect of social networks that has been studied. Homophily manifests itself in a variety of ways, including actions, interests, and demographic traits. It significantly affects how information spreads and how social bonds are formed. Moreover, the concept of influence in social networks has received a lot of attention. The capacity to alter the thoughts, feelings, and actions of those around one is known as influence. Understanding and modeling influence across a range of fields, such as public health, marketing, and the social sciences, is crucial for forecasting and manipulating the dissemination of information, product acceptance, and social phenomena. Within the framework of social media platforms, social media influence maximization is a particular application of the more general idea of influence maximization. The challenge of identifying a small sample of nodes in a social network that have the potential to increase influence diffusion is known as influence maximization.

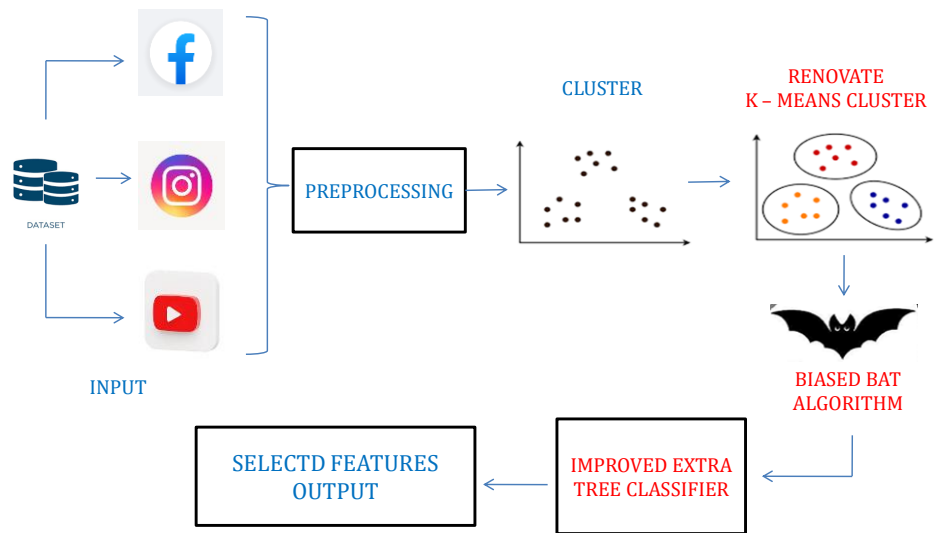


PROBLEM DEFINITION

The study addresses the problem of enhancing predictive modeling for social recommendation by examining social homophily and influence. It offers a unique approach that uses biased clustering techniques and feature selection on Facebook, Instagram, and YouTube datasets. By using biased feature prioritization to include domain knowledge, the method improves prediction accuracy and relevance and makes decision-making and trend forecasting across several domains more efficient.

MATERIALS AND METHODS

This chapter covers the systematic approaches used to improve feature selection and preprocess the dataset. assemble the three types of datasets. Next, a special variant of the Biased Renovate K-Means Clustering is used to prepare the data. This study selects features using a biased bat method and an enhanced additional tree classifier following data preparation. The flowchart for the Social Recommendation model utilizing Influence Predictive modeling and Social Homophily is displayed in Figure.



PROPOSED BIASED CLUSTERING AND FEATURE SELECTION FOR ENHANCED PREDICTIVE MODELING IN SOCIAL MEDIA INFLUENCE MAXIMIZATION

DATASET COLLECTION

The dataset has collected from <https://www.kaggle.com/datasets/sheenabatra/facebook-data>, containing 2913 records, <https://www.kaggle.com/datasets/kpurba/im-instagram-70k>, containing 70409 records <https://www.kaggle.com/datasets/kathir1k/youtube-influencers-data>, containing 906 records for Social Recommendation . Datasets are the raw material used to derive important insights, trends, and forecasts. This lecture delves into three diverse kinds of datasets, each from a separate area, demonstrating the range of applications for data analysis and machine.

Algorithm 1: Biased Renovate K-Means Clustering
Input: Raw Data: The initial dataset containing the unprocessed information.

• Steps: Initialization: Randomly select K - initial cluster centers. Define the specific factors or criteria influencing the clustering process. • Assign Data Points to Clusters: Calculate the distance between each data point and all cluster centers using the Euclidean distance formula. Apply bias based on specific factors to influence the assignment of data points to clusters. Assign each data point to the cluster with the closest center, considering both Euclidean distance and biased factors. • Update Cluster Centers: Recalculate the mean of data points within each cluster to determine new cluster centers. Apply the biased factors to modify the cluster center calculation if necessary. • Output: Cluster Assignments: Each data point is assigned to one of the K clusters.

Algorithm 2: Biased Bat Algorithm with Improved Extra Tree
• Input: Raw Data: The original dataset containing unprocessed features. Bias Parameters: Specific factors or criteria based on domain knowledge, influencing feature selection. • Steps: Initialization: Set initial positions, pulse emission rates, velocities, loudness, and frequencies for each bat. Facebook, Instagram , Youtube Establish initial random feature subsets. • Biased Bat Algorithm: Apply echolocation-inspired logic, exploring and exploiting the feature space. • Prioritize features based on specific bias parameters. Update bat positions, frequencies, velocities, and loudness using: • Feature Subset Selection: Use the selected features from the bats' positions as candidate feature subsets. Apply the Enhanced Extra Tree Classifier to evaluate the subsets' performance. Rank feature subsets based on their effectiveness and bias influence.

RESULTS AND DISCUSSION

Maximizing influence on social media is a crucial goal for companies, marketers, and influencers themselves. Finding important people or organizations that can spread information efficiently to increase reach and engagement is a science as much as an art. In order to maximize social media influence, this study explored and used feature selection and preprocessing techniques, with an emphasis on obtaining reliable and useful insights from data. A sizable dataset was effectively collected and cleaned by this approach from several platforms and dataset repositories. In order to identify the optimal feature set, it involves addressing missing values, standardizing data, and removing noise from the data. Counting followers, analytics (likes, shares, and comments), content quality, and uploading were some of these aspects.

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