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Social Media Application for Recruitment Using Pythagorean Fuzzy

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Abstract

The growth of social media is now utilized all over the world. In the past several years social media is used to communicate between person for information sharing and entertainment but now social media is also used for the hiring. This work collects data through questionnaire and online dataset on the recruitment process for three social media i.e. Facebook, Twitter, and LinkedIn. Pythagorean Fuzzy Relation (PFR) is an expansion of both Fuzzy Relationship and Fuzzy Intuitionist Relationship. The Pythagorean fuzzy set is a modern conceptual structure with greater capacity to deal with imprecision rooted in decision making. So we used this technique to identify a social media containing more number of positive respondents in recruitment process. Consequently, Facebook is proved to have high positive feedback and low negative feedback than others. It is observed that time management factor has high impact as it achieves 0.4583 composite range than others. It is also analyzed that abusive factor should be taken care by social media during recruitment as it occupies high range of negative i.e. 0.20519 composition than others.

Keywords: Pythagorean Fuzzy relation, recruitment process, social media analysis, Facebook, and Twitter analysis.

1. Introduction

Social media is known as a real networking platform, which helps to connect people, chat with friends, search and share news or any information. Huge amount of tools for communication and information are available in social media. Also, many channels are provided by social media for communication in both working and social environment [1]. In the process of recruitment, the divisions of human resources and job seekers are highly using social media. The recruitments via social media are increased because social platforms are used as a promotion channels by employers for candidate hiring and sourcing [2].

1.1 Social Media Impacts

The hiring and recruitment sectors are highly affected by social media because those sector phases get completely changed after appearance of the social media. Now, a selection is not only based on the resume but a candidate's fate is also decided through the important role of social media with hiring company. It is observed that there is a heavy social media impacts on those sectors because the social media is checked by the 19% of hiring managers before making their decision about interviewee. The profile of a person in the social media is enough to decide about him which means the profile is considered as a deciding factor. Another study proposes that the social media is used by the 60% of employers for job candidate's researches. It is a social media's another positive impact that it becomes a path between job searching candidates and hiring authorities [1].

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1.2 Pythagorean Fuzzy Relation

Pythagorean Fuzzy sets are the generalization of the intuitionistic Fuzzy sets and widely applicable in many fields. After its appearance, several extensions such as interval-valued Pythagorean Fuzzy sets, hesitant Pythagorean Fuzzy sets, come into the play to solve the analysis of social media applications. This work uses the Pythagorean Fuzzy relation with respective formula [1].

This work proposed an idea of relation called Max-Min-Max composition with numerical illustrations to validate the developed association. This modification introduces membership (μ) and non-membership rule (ν), which assigns a number from the unit interval $[0, 1]$ for each aspect of the discourse universe to denote the degree of belonging to the group considered. The definition of fuzzy sets generalises the principle of classical sets by facilitating intermediate conditions between the entire and zero. A membership function is described in a Fuzzy collection to explain the degree of membership of an entity in a class. The membership value varies from 0 to 1, where 0 implies that the entity does not belong to a class, 1 represents 'belongs to', and other costs represent the degree of membership to such a class. The membership function supplemented the characteristic function in smooth sets for fuzzy sets. This work determines a similar measure between two Pythagorean fuzzy sets. First it is necessary to present the method for calculating a similar measure for two Pythagorean fuzzy values using respective formulas and then extend it for two Pythagorean fuzzy sets.

$$A \cup B = \{(x, \max((\mu_A(x), \mu_B(x)), \min(\nu_A(x), \nu_B(x)))) \mid x \in X\}$$

$$A \cap B = \{(x, \min((\mu_A(x), \mu_B(x)), \max(\nu_A(x), \nu_B(x)))) \mid x \in X\}$$

Example of the proposed work calculation: Let $E, F \in \text{PFS}(X)$ for $X = \{x_1, x_2, x_3\}$. Suppose that $E = \left\{ \left(\frac{0.6, 0.2}{x_1} \right), \left(\frac{0.4, 0.6}{x_2} \right), \left(\frac{0.5, 0.3}{x_3} \right) \right\}$ and $F = \left\{ \left(\frac{0.8, 0.1}{x_1} \right), \left(\frac{0.7, 0.3}{x_2} \right), \left(\frac{0.6, 0.1}{x_3} \right) \right\}$. We find the composition T using respective formulae that are membership function $\mu_T(y) = \bigcup_x (\min[\mu_A(x), \mu_B(x, y)])$ and non-membership function $\nu_T(y) = \bigcap_x (\max[\nu_A(x), \nu_B(x, y)])$ as $\mu_B(e_i, f_k) = \max_{x_j \in X} (0.6, 0.4, 0.5) = 0.6$ and $\nu_T(e_i, f_k) = \min_{x_j \in X} (0.2, 0.6, 0.3) = 0.2$ then Composition $T = \mu_T - \nu_T \pi_T$ and $T = 0.6 - 0.2 * 0.7776 = 0.4451$.

The objective of this work is to analyse the user needs and impacts for online recruitment through the collection of user feedback. In this work, all the social media applications which are helpful for recruitment are considered initially. Among them, top 3 applications are considered for analysis. Then primary dataset is considered by making a survey from the users of those application using questionnaire generated by us. Also secondary dataset is collected to gather the opinion of the users globally. From the above 2 datasets, the positive and negative comments are segregated in order to find the sentiment of the users over the application. The weightage of the sentiment of the users is analysed more precisely by segregating the feedback into 5 important factors for positive (Performance, Financial benefit, Time management, Usefulness, Employee analysis) and negative (Insecure, Abuses, Network issues, Vagueness, Real time issues) sentiments. Then the opinion of the users for those factors are assessed and to be noted between very satisfied, good and satisfied for positive factors and very unsatisfied, bad and unsatisfied for negative factors. The highest number of very satisfied customers and the highest number of very unsatisfied customers for all the 10 factors are noted for the top two applications and they are used to calculate the PFR. This implies the opinion of customer on each factor of both the applications. By using this result, the strength and weakness of the applications can be clearly noted and any improvements shall be made wherever needed. This is clearly depicted in Figure 1.

1.3 Max-Min-Max Composition rule

[1] Proposed the min-max composition rule using Pythagorean fuzzy relation, Let $A \in \text{PFS}(X)$. Then, the max-min-max composition of $R(X \rightarrow Y)$ with A is a PFS B of Y denoted by $B = R \circ A$, such that its membership and non-membership functions are defined by the following

$$\mu_B(y) = \max(\min[(\mu_A(x), \mu_R(x, y))] \text{ And } v_B(y) = \min(\max[(v_A(x), v_R(x, y))])$$

Therefore, $\forall x \in X$ and $y \in Y$

Let $Q(X \rightarrow Y)$ and $R(Y \rightarrow Z)$ be two PFRs. Then, the max-min-max composition $R \circ Q$ is a PFR from X to Z , such that its membership and non-membership functions are defined by the following.

$$\mu_{R \circ Q}(x, z) = \max(\min[(\mu_Q(x, y), \mu_R(y, z))] \text{ And } v_{R \circ Q}(x, z) = \min(\max[(v_Q(x, y), v_R(y, z))])$$

Therefore, $\forall (x, z) \in X \times Z$ and $\forall y \in Y$

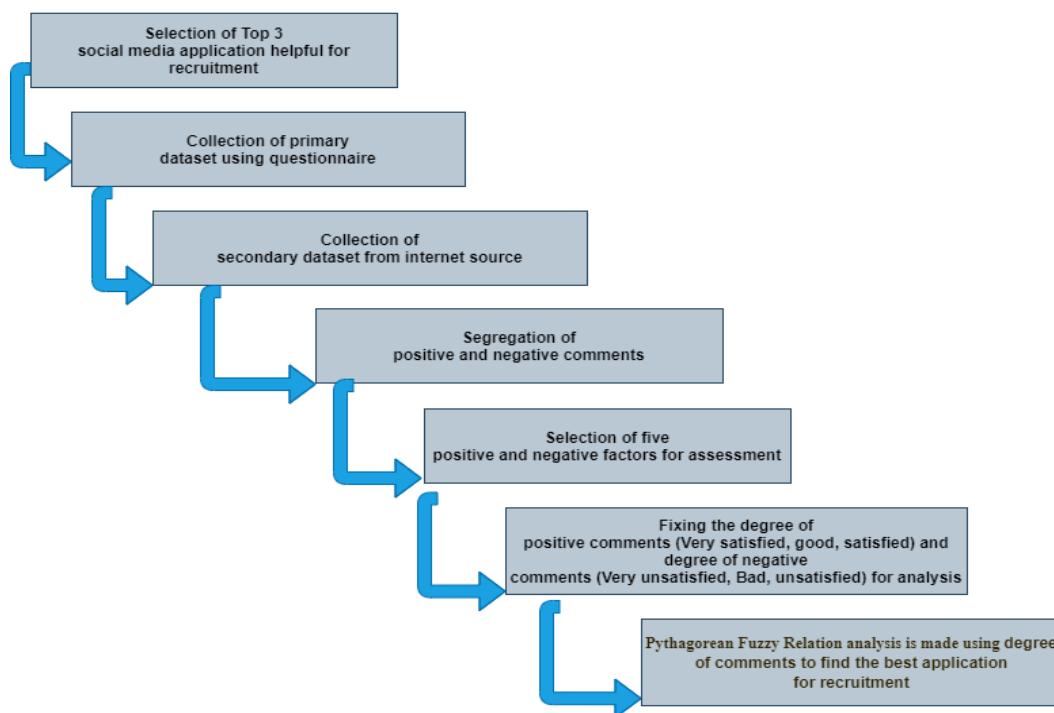


Figure 1- Flow of the Proposed Work

Our contribution is as follows:

- To collect respondents of users through questionnaire and online dataset and determine the best among top social media applications using Pythagorean Fuzzy relation more accurately.
- To identify the overall highly positive commented and highly negative commented social media application among all.

2. Literature Survey

2.1 Pythagorean Fuzzy

[1] Developed a Pythagorean Fuzzy relation known as max-min-max composition for matching the perfect careers to the candidates. They also addressed the multi-attribute and multi-criteria decision-making problems using their proposed approach. As a generalized set, PFS has close relationship with IFS. The construct of PFSs can be used to characterize

uncertain information more sufficiently and accurately than IFS. An improved score functions for the ranking order of interval-valued Pythagorean fuzzy sets (IVPFSs). Based on it, a Pythagorean fuzzy technique for order of preference by similarity to ideal solution (TOPSIS) method, takes the preferences of the experts in the form of interval-valued Pythagorean fuzzy decision matrices are discussed. Other explorations of the theory of PFSs can be found. Pythagorean fuzzy set has attracted great attentions of many researchers, and subsequently, the concept has been applied to many application areas such as decision-making, aggregation operators, and information measures. [2] Implemented a novel Pythagorean Fuzzy distance measure and similarity measure. Some interesting properties of distance measure and similarity measures are proved. Some counterintuitive examples are presented to state their availability of similarity measures among PFS. [3] have designed an algorithm for coping with multi-attribute decision-making problems with a combined use of the generalized intuitionistic Fuzzy soft set, the extended intersection operation, the intuitionistic Fuzzy weighted averaging operator and other related notions. [4] The determined individual goodness of fit and poorness of fit is calculated and a new parametric LINMAP model is further constructed. The applicability of the established method is discussed through the practical application of investment in the railway project.

2.2 Social media analysis

[5] Examined the survey about the usage effect of social media in service providing sectors on the job performance of employee. They used the simple random sampling technique to collect survey data from 205 respondents. They also developed the method of Structural Equation Modelling for analyzing collected data. [6] Proposed a recruitment method by using social media between employers. The data are collected using a descriptive research design from organizations and that design uses a quantitative method. [7] Presented the views of domestic and foreign experts on the recruitment of employees using social networks. They compared the theoretical knowledge with the results of social networking research in SMEs in Slovakia and especially their use in the process of recruiting employees. [8] Examined the impact of social media on students' academic performance. A structural questionnaire is constructed to elicit information from 345 randomly selected students of MawlanaBhashani Science and Technology University (MBSTU), Tangail, Bangladesh. Both univariate and multivariate analysis are used to meet the objective. [9] Presented the study with the aim to analyse the personal social media preferences and opinions, as well as social media features and their usage within projects. [10] Investigated the extent of social networking impact on the Indian youth. The reason for selecting youth as the target audience is because the direction of a country and culture is decided mainly by the youths of that country. [11] Made a study which identified that the candidates are leaning away from jobs joining due to many reasons and many people have not interested to use social media for the job searching purpose. It discussed the role of social media in job search. [12] Assessed the impact of social media on academic performance of selected college students. In this work, the author raises the actual impact of daily communication of youth in social media. Descriptive research design is utilized to gain accurate profile of situation. Sixty Business Administration and Management Information System students who are actively using social media are the respondents of this study. [13] Investigated the impact of social media on the recruitment process in South Africa. The sample comprised 12 recruiters, spanning a wide range of industries in South Africa. Semi-structured interviews are conducted and a thematic analysis is utilized in this work to identify themes and subthemes. The use of Twitter and Facebook for recruitment is found to be substantially lower in South Africa than elsewhere. Without following a focused approach, the volume of work that emanates from using social media may overwhelm a recruiter. [14] Examined how social media pages can be used to influence potential applicants' attraction. Based on the uses and gratifications theory, this study examines whether organizations can

manipulate the communication characteristics in formativeness and social presence on their social media page to positively affect organizational attractiveness. [15] Aimed at discussing the role of social media on e-recruitment process based on existing literature. Most of the previous studies indicate that social media is not being used as the main source of e-recruitment, rather as one of the secondary sources. Further, it has been revealed that such utilization of social media as complementary source is getting popular due to the inexpensive availability of information.[16] Investigated the employers' perception regarding the use of LinkedIn as a recruitment tool. A sample size of 49 employers has been selected based on convenience sampling method from 2 cities in Bangladesh who have organizational LinkedIn profiles. In order to reveal their perceptions, 153 graduate seeking candidates are selected through purposive sampling who had active LinkedIn accounts and are sent to those employers for the jobs of paid internship. [17] Used the literatures published from 2010 to 2019 to highlight the research on social media influence on searching talent for organizations. For due purpose, Scopus and Research Gate databases have been utilized to search the papers using the keywords such as social media, social networking sites, online recruitment & selection, candidate screening, hiring, human resources management and talent search.[18] Explained that the top organizations are carried out recruitment and sourcing process by using social media networking sites. Social networking sites are used to facilitate, source and improve process of recruitment method in HR management and development. Social networking sites address the needs of employers and job-seekers via internetworking on electronic platform likes face book, twitter, LinkedIn, naukri.com, and monster.com means which increase the speed of employment, reducing the cost of recruitment, huge availability of jobseekers and improve the quality of recruitment and services.[19] Presented an extensive review of pertinent literature, the conclusions are limited because the review is qualitative and does not provide meta-analytic insights, such as effect size. Research on PSMs and their impact on HR processes is in its nascent stage, and the growth of literature on this topic will pave the way for meta-analytic reviews in the future.

3. METHODOLOGY

Data has been collected using both primary and secondary sources. Primary data includes information gathered through a questionnaire based on the perception of social media users using recruitment purposes. Secondary data includes the information collected through online dataset [20]. There are ten essential factors used for this analysis. The five types of factor are used to analysis the positive feedback and another five types of factor are used to analysis the negative feedback.

Factors and definitions

Performance: It helps to measure the effectiveness of the hiring process in each applications

Financial benefit: It helps to measure the recruitment costs via social media applications

Time management: It measures the hiring time for each applications.

Usefulness: It measures the application's usefulness from the respondent's side.

Employee analysis: It helps to analysis, how the customer profile selection is made in every applications.

Insecure: It measures how the user profiles and other details are maintained insecurely in each application.

Abuses: It helps to analyze the threat based on wrongly sharing any recruitment information from abusers.

Network issues: It helps to measure any network issues while processing and searching the recruitments page.

Vagueness: It measures the vagueness felt in recruitment process by the respondents.

Real time issues: It helps to measure real time issues like outdated candidate profile or any other similar issues.

Table 1 -Positive Comments

Positive Commands
Very satisfied
Good
satisfied

Tables 1 and 2 refers the six types of consumer's perception. They are very satisfied, good, satisfied, very unsatisfied, bad, and unsatisfied over the ten essential factors for a company to satisfy the recruitment needs of the user in day to day life. These are validated using a fuzzy relation membership function.

Table 2-Negative Comments

Negative Commands
Very unsatisfied
Bad
unsatisfied

Table 3-Sample Feedback of the Recruiters about Social Media through questionnaire

Questionnaires	People	Application	PFR range for respondents counts	comments
Is Facebook best for recruiting within short time?	P1 to p37	Facebook	0.37	Satisfied
Is the performance of the Facebook excellent?	P38 to 044		0.6	unsatisfied
Is Twitter a good platform to locate job leads, as both recruiters and companies are increasingly hiring via Twitter?	P45 to 62		0.17	Good
280 Character limit: Many people find it difficult to express themselves in such a short character count via Twitter.	P63 to 73	Twitter	0.10	unsatisfied
Have used the LinkedIn platform to find the top talent?	P74 to p88	LinkedIn	0.14	Good
Is here a search limit to search your 1st connection?	P89 to p100		0.11	Very unsatisfied

Table 3 contains the proposed questionnaires based on the recruitment of Facebook, Twitter, and LinkedIn applications. 100 respondents has given their perceptions based on their day to day life usages. This work calculates the PFR range to calculate the fuzzy relation between applications using the respondents count.

Table 4-Sample Feedback of the Recruiters about Social Media through online

Social Media Network	Participants	Age	Years of recruitment experience	Location	Industry specialization for recruitment	Feedback
FACEBOOK	P1	29	7 years	Hawaii	Financial Markets	“Facebook is used 100% of time”
	P2	28	5 years	South Dakota	Management Consultants	“Facebook Recruiter is the best tool that I ever come across”
	P3	28	5 years	Wisconsin	Financial Markets	“I don’t do anything on Twitter” “I’m not connected enough on Twitter, not enough people follow me. I don’t focus enough attention on what my brand is on Twitter”
TWITTER	P4	43	15 years	Vermont	Financial Services	“There is no possibility to connect with our customer support”
LINKEDIN	P5	27	7 years	Missouri	Marketing manager	“The WORST online recruitment platform and getting worse!”
	P6	37	10 years	South Dakota	Information technology	

Table 4 contains the sample feedbacks which are collected from Facebook, Twitter, and LinkedIn. The respondents have given their perception based on their usages. Six feedbacks are taken for sample through participants from different locations. They shared their experiences about social media applications in their job search.

Table 5-Positive Facebook Perception

Factors	Positive Feedback of Facebook		
	Very satisfied	Good	Satisfied
Performance	0.67	0.15	0.18
Financial benefit	0.78	0.16	0.6
Time management	0.70	0.20	0.10
Usefulness	0.84	0.4	0.12
Employee analysis	0.88	0.7	0.5

Table 5 contains the positive feedbacks of Facebook that are segregated to very satisfied, good, and satisfied. The positive factors are useful to identify the positive impact of Facebook

on the recruitment. Observed from the Table 5, the 'employee analysis' has the highest impact factor because 88 number of respondents are very satisfied in this context when using the Facebook for recruitment.

Table 6-Positive Twitter Perception

Factors	Positive Feedback of Twitter		
	Very Satisfied	Good	Satisfied
Performance	0.52	0.20	0.28
Financial benefit	0.65	0.18	0.17
Time management	0.58	0.16	0.26
Usefulness	0.74	0.14	0.12
Employee analysis	0.69	0.17	0.14

Table 6 contains the positive feedbacks of Twitter. Observed from the Table 6, the 'usefulness' factor has the highest impact because 74 number of respondents feels Twitter is very useful for recruitment.

Table 7-Positive LinkedIn Perception

Factors	Positive Feedback of LinkedIn		
	Very Satisfied	Good	Satisfied
Performance	0.65	0.15	0.20
Financial benefit	0.75	0.8	0.17
Time management	0.68	0.15	0.17
Usefulness	0.81	0.10	0.9
Employee analysis	0.85	0.7	0.8

Table 7 contains the positive feedbacks of LinkedIn. Observed from the Table 7, the 'employee analysis' has high impact than others because 85 number of respondents feels very satisfied in this context when using the LinkedIn for recruitment.

Table 8-Negative Facebook Perception

Factors	Negative Feedback of Facebook		
	Very Unsatisfied	Bad	Unsatisfied
Insecure	0.14	0.50	0.36
Abuses	0.12	0.56	0.32
Network issues	0.24	0.61	0.15
Vagueness	0.13	0.67	0.20
Real time issues	0.17	0.72	0.8

Table 8 contains the negative feedbacks of Facebook that are segregated to very unsatisfied, bad, and unsatisfied. The negative factors are useful to identify the negative opinion of Facebook users on the recruitment process. The negative feedback analysis takes the very unsatisfied comment to reveal the decision. From the respondent's side, Facebook needs to address the network issues while using that for recruitment because 24 number of respondents are very unsatisfied with this factor.

Table 9-Negative Twitter Perception

Factors	Negative Feedback of Twitter		
	Very Unsatisfied	Bad	Unsatisfied
Insecure	0.25	0.60	0.15
Abuses	0.34	0.64	0.2
Network issues	0.38	0.59	0.3
Vagueness	0.27	0.48	0.25
Real time issues	0.38	0.61	0.1

Table 9 contains the negative feedbacks of Twitter. From the respondent's side, Twitter needs to address the network and real time issues while using that for recruitment because 38 number of respondents are very unsatisfied this field.

Table 10-Negative LinkedIn Perception

Factors	Negative Feedback Of LinkedIn		
	Very Unsatisfied	Bad	Unsatisfied
Insecure	0.16	0.52	0.32
Abuses	0.15	0.59	0.26
Network issues	0.20	0.65	0.15
Vagueness	0.17	0.71	0.12
Real time issues	0.21	0.75	0.4

Table 10 contains the negative feedbacks of LinkedIn. From the respondent's side, LinkedIn need to address the real time issues while using that for recruitment because 21 number of respondents are very unsatisfied in this context.

3.1 Pythagorean Fuzzy Relation in Feedback Analysis

In social media recruitment analysis, investigation of the PFSs' resource-fullness through max–min–max rule is the motivation of this paper because social media applications have biggest scope in handling real life problems. The exploration of PFSs notion and its applications for recruitment process in social media performance by using composition of max–min–max is the main goal of this work. The extension of Fuzzy relation and intuitionistic Fuzzy relation is known as Pythagorean Fuzzy relation. Finally, a proposed relation helps to explain the Pythagorean Fuzzy sets' new application in social media based on the recruitment performance, that relation is represented in equation 1.

$$PF(FTL) = \mu_{FUTUL} \max_{f,t,l} PF(f,t,l), \nu_{F \cap T \cap L} \min_{f,t,l} PF(f,t,l) \quad (1)$$

In Equation 1, the UNION(\cup) and INTERSECTION(\cap) operations are used on positive feedbacks of Facebook, Twitter, and LinkedIn for combining those feedbacks and find which social media have the maximum number of positive feedback as well as the minimum number of positive feedback.

$$NF(FTL) = \mu_{FUTUL} \max_{f,t,l} NF(f,t,l), \nu_{F \cap T \cap L} \min_{f,t,l} NF(f,t,l) \quad (2)$$

In Equation 2, the UNION(\cup) and INTERSECTION(\cap) operations are used on negative feedbacks of Facebook, Twitter, and LinkedIn for combining those feedbacks and find which social media have maximum number of negative feedback as well as minimum number of negative feedback that are stated in Table 10. F denotes the Facebook, T denotes the twitter, NF denotes the negative feedback. Here π value can be calculated using equation 3. Pythagorean fuzzy set (PFS) is proposed in [3] to deal with vagueness considering the membership grade μ and non-membership grade ν satisfying the conditions $\mu + \nu \leq 1$ or $\mu + \nu \geq 1$, and also, it follows that $\mu^2 + \nu^2 + \pi^2 = 1$, where π is the Pythagorean fuzzy set index.

$$\pi = \sqrt{1 - \mu^2 + \nu^2} \quad (3)$$

3.2 Illustration to assess the social media which received highest positive feedback considering the count of very satisfied comment

π Value should be calculated by counting the number of very satisfied feedback given among all the three social media for all the five factors. Here μ represents the highest number of very

satisfied feedback and v represents the lowest number of very satisfied feedback. This calculation considered the very satisfied comments from Facebook and twitter only. Because only these two have the highest and lowest number of very satisfied comments than LinkedIn. Here for sample, only performance factor is considered and this calculation is similar to the remaining four factors as well.

$$\begin{aligned}\pi &= \sqrt{1 - \mu^2 + v^2} \\ &= \sqrt{1 - 0.67^2 + 0.52^2} \\ &= \sqrt{1 - 0.4489 + 0.2704} \\ &= \sqrt{1 - 0.7193} \\ &= \sqrt{0.5298} \\ \pi &= 0.7278\end{aligned}$$

This calculation is similar to the remaining factors. After finding the π value for all factors, it is tabulated in Table 13.

- Determining the composite 't' value for performance factor

$$t = \mu - v\pi \quad (4)$$

$$t=0.67-0.52(0.7278)$$

$$t= 0.10917$$

This calculation is similar to the remaining factors. After finding all composite values for all factors, it is tabulated in Table 14. Table 14 contains the composite 't' values of Facebook and Twitter for all positive factors which are calculated by equation 4.

Table 11-Comparison of Positive Feedbacks from Facebook and Twitter

Factors	Highest Positive Feedback(μ)	Lowest Positive Feedback(v)
Performance	0.67	0.52
Financial benefit	0.78	0.65
Time management	0.70	0.58
Usefulness	0.84	0.74
Employee analysis	0.88	0.69

In Table 11, μ refers the highest value of positive feedbacks and v refers the lowest value of positive feedback. It is used to combine by equation 1 to identify the best feedbacks to evaluate the composition T. Positive feedbacks of all the factors related to Facebook and Twitter are analyzed using PFR. Facebook application has the highest positive feedback, therefore Facebook is considered to serve the best, compared to twitter.

Table 12-Comparison of Negative Feedbacks from Facebook and Twitter

Factors	Highest Negative Feedback(μ)	Lowest Negative Feedback(v)
Insecure	0.25	0.14
Abuses	0.34	0.12
Network issues	0.38	0.24
Vagueness	0.27	0.13
Real time issues	0.38	0.17

In Table 12, μ refers the highest value of negative feedbacks and v refers the lowest value of negative feedback. It is used to combine by equation 1 to identify the best feedback to evaluate the composition T. Negative feedbacks of all the factors related to all Facebook and Twitter are analyzed using PFR. Facebook application has the lowest negative feedback, therefore Facebook is considered to serve the best, compared to twitter.

Table 13– π Value for Positive Factors

Positive Factors	π Value
Performance	0.5298
Financial benefit	0.1757
Time management	0.41665
Usefulness	0.50358
Employee Analysis	0.50049

Table 13 contains the π value of Facebook and Twitter for all positive factors which are calculated by equation 3. This π values are used to calculate the composite 't' using equation 4 and the same is depicted in Table 14.

Table 14-Composite 't' value for Positive Factors

Positive Factors	Composite 't' value
Performance	0.10917
Financial benefit	0.02284
Time management	0.4583
Usefulness	0.05035
Employee Analysis	0.09518

On observing Table 14, it is clear that the time management is the top-rated factor among all other positive factors in the recruitment process.

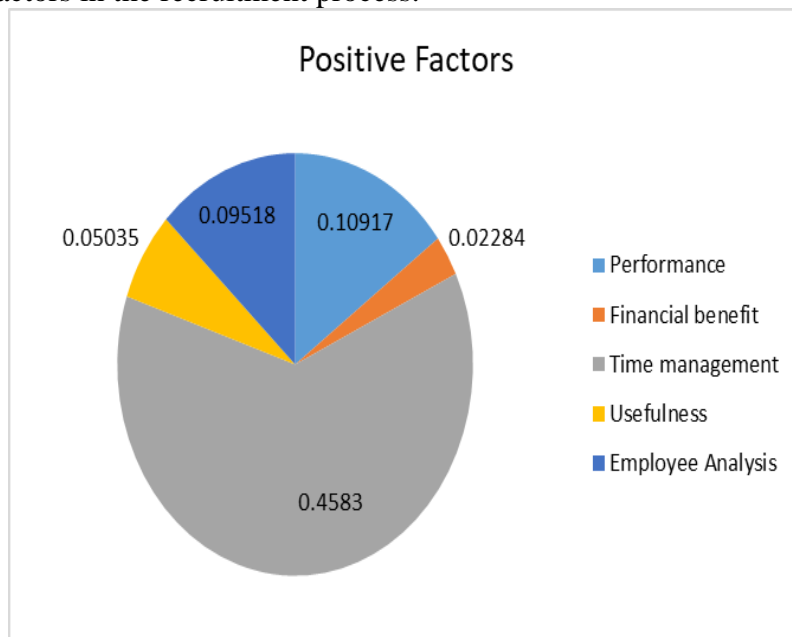
**Figure 2**-Composite Value for Positive Factors

Figure 2 shows the pie chart representation of each positive factor from Table 14. In this chart, performance, financial benefit, time management, and usefulness occupies the values 0.10917, 0.02284, 0.4583, 0.05035, 0.09518 respectively. The composition t is used to analyze the best factors among all.

3.3 Illustration to assess the highest negative feedback received social media considering the count of very unsatisfied comment

π Value should be calculated by counting the number of very unsatisfied feedback given among all the three social media for all the five factors. Here μ represents the highest number of very unsatisfied feedback and v represents the lowest number of very unsatisfied feedback.

This calculation considered the very unsatisfied comments from Facebook and twitter only. Because only these two have the highest and lowest number of very unsatisfied comments than LinkedIn. Here for sample, only insecure factor is considered and this calculation is similar to the remaining four factors as well.

$$\begin{aligned} \pi &= \sqrt{1 - \mu^2 + v^2} \\ &= \sqrt{1 - 0.25^2 + 0.14^2} \\ &= \sqrt{1 - 0.0625 + 0.0196} \\ &= \sqrt{1 - 0.0821} \\ &= \sqrt{0.9580} \\ \pi &= 0.9787 \end{aligned}$$

1 Determining the composite ‘t’ value for the factor ‘insecure’ using equation 6. Started without explanation

$$\begin{aligned} t &= \mu - v\pi \\ t &= 0.25 - 0.14(0.9787) \end{aligned}$$

t= 0.10765

This calculation is similar to the remaining factors. After finding all composite values for all factors, it is tabulated in Table 16. Table 16 contains the composite ‘t’ values of Facebook and Twitter for all negative factors which are calculated by equation 4.

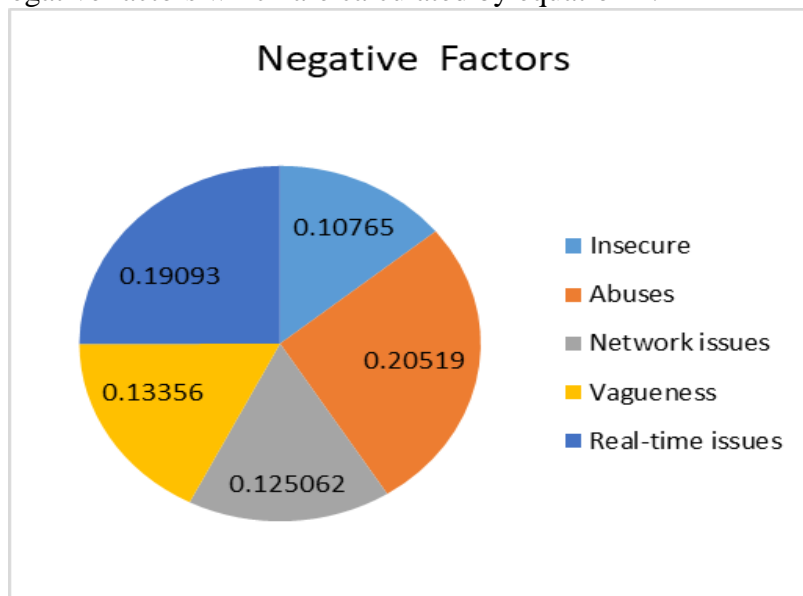


Figure 3-Composite Value for Negative Factors

Figure 3 shows the pie chart representation of composite value of negative factors from Table 16. The composition t is used to analyze the best factors among all.

Table 15-π value for Negative factors

Negative Factors	π value
Insecure	0.9787
Abuses	0.9327
Network issues	0.8933
Vagueness	0.9540
Real-time issues	0.9092

Table 15 contains the π value of Facebook and Twitter for all negative factors which are calculated by equation 3. This π values are used to calculate the composite 't' value.

Table 16-Composite 't' value for Negative factors

Negative Factors	Composite 't' value
Insecure	0.10765
Abuses	0.20519
Network issues	0.125062
Vagueness	0.13356
Real-time issues	0.19093

On observing the Table 16, it is clear that abuses factor have high range of negative feedback among all other factors based the recruitment of social media. It is also obvious from the user perception analysis, Facebook needs to solve the issues based on the abuses.

4. RESULT AND DISCUSSION

It is observed from our analysis that Facebook occupies highest usage than any other social media. Table 17 contains the usage percentage of social networks and there are two categorize of usage namely monthly and daily. It is also observed from a questionnaire regarding the perception of respondent against the social media and depicted in Table 18. These are categorized in five ways which are strongly disagree, disagree, neutral, agree and strongly agree.

Table 17-Usage of social media in day-to-day life

Social Media	Use of Social Networks	
	Used Monthly	Used Daily
Facebook	68%	45%
You tube	63%	21%
Twitter	12%	3%
Instagram	16%	6%
Snapchat	6%	2%

Table 18-Respondent's perception of social media

Different Context of Social Media	Perception of the Respondents				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Social media as effective tool for job search	3.0	5.0	20.5	50.5	21.0
Change behavior of job seeker	0.5	6.5	20.0	53.5	19.5
Positive impact of job seekers	1.0	4.5	22.0	51.5	21.0
Facebook & LinkedIn really help	1.0	9.5	29.0	39.5	21.0
Have security threats	10.5	10.5	26.0	37.0	16.0

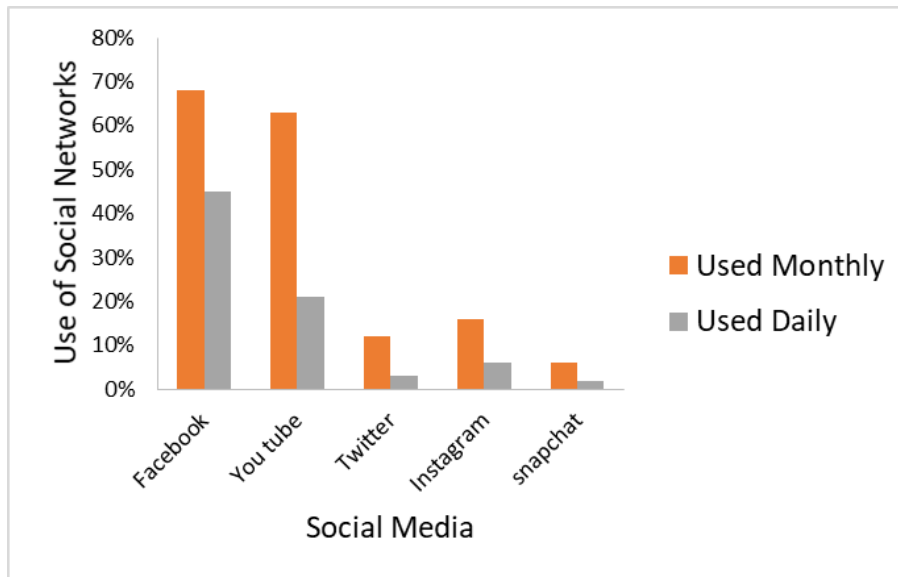


Figure 4-Social Media and Their Usage

Figure 4 shows comparison between one or more social media usages. Facebook has more both monthly and daily usage than YouTube. Snapchat has less number of usage than other four social media.

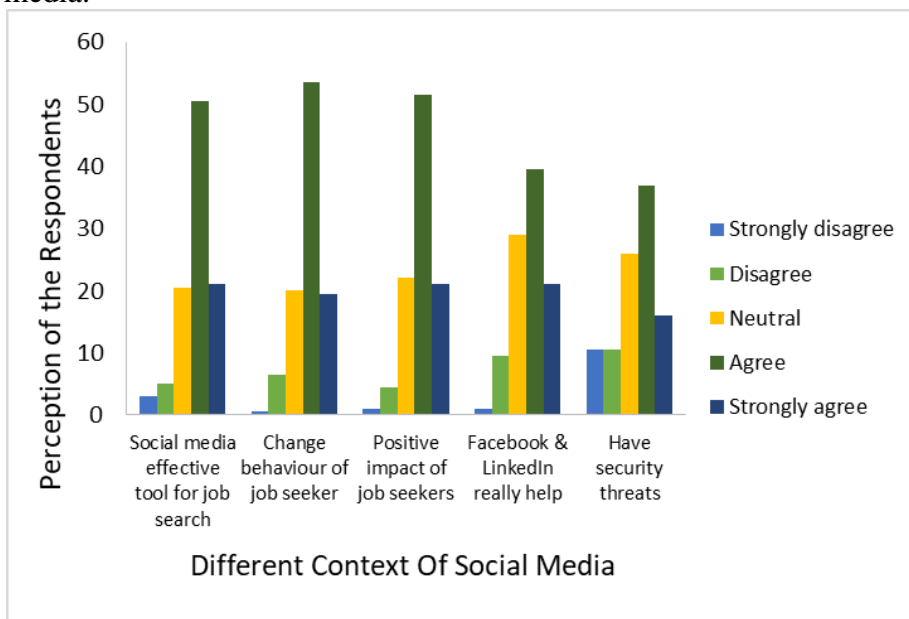


Figure 5-Context of Social Media and Their Perceptions

Figure 5 implies that there are five contexts of social media. Each context has five perceptions. Every context has the maximum number of agreed statements. Compared with other context ‘change behavior of job seekers’ have a higher number of an agreed statement as well as the lower number of strongly disagree statement. This is the best and final observation of this analysis.

FINDINGS

One of the most important purpose of social media is recruitment process. This research analyzed the three types of social media applications (Facebook, LinkedIn, and Twitter). It is found that Facebook has high impact on recruitment process than LinkedIn and Twitter. Table 4 depicts the sample feedbacks of the recruiters on social media and its analysis. It is learnt from the feedback that most of the recruiters is choosing Facebook for its simplicity. It

is also observed that connecting more people is not a problem in Facebook but it is difficult in Twitter and it's more complicated in LinkedIn. If the latter two addresses this issue, it could lead the race. Also the volume of users of Facebook is more than the other two which is also an important factor which enables fast recruitment by the companies.

IMPLICATION OF THE STUDY

The study analyses and highlights the ten significant factors which are helpful to identify the behavioral analysis of recruitment through social media. Increasingly, job seekers are turning to electronic resources such as corporate web sites, federal, state, and municipal job postings, online job search engines and aggregators, applications, Internet classifieds, and online versions of local and national newspapers to facilitate the job search process. Conversely, a growing majority of employers have moved a significant proportion of their recruitment efforts to online. This research describes that the most of the application users are trying to seek their jobs through Facebook, Twitter, and LinkedIn. Finally, this research reveals that Facebook is one of the simplest applications for job seekers when analyse the collection of feedbacks. It is vital to have a regulator to enforce the rules and carry out an evaluation of the social media applications and online campaigns to create awareness of the fast-growing recruitment via online are necessary.

RECOMMENDATIONS

This analysis suggested the following:-

Facebook and Twitter: Time management factor has high impact on Facebook and twitter because the recruiters, find qualified people within short time. From user side, both need to decrease the abuse information related to recruitment.

LinkedIn: Good in searching top talents profile that is most welcome from the user side. From user perception, need to decrease the searching limit.

5. CONCLUSION

This research work reveals that social media is useful for recruitment. While analyzing the social media applications using Pythagorean Fuzzy relations, the Facebook and LinkedIn application has high number of positive responses than Twitter. The questionnaire and online dataset is helpful for analysing social media application. The collected dataset is considered to analyse both positive and negative factors. It is observed from the survey that the financial benefit is the factor which achieves high impact than others.

Conflict of Interest: The author confirms that there is no conflict of interest to declare for this publication.

References

- [1] P.A. Ejegwa, "Pythagorean Fuzzy set and its application in career placements based on academic performance using max–min–max composition", *Complex & Intelligent Systems*, vol.5, pp.165–175, 2019, doi:10.1007/s40747-019-0091-6
- [2] X. Peng, New similarity measure and distance measure for Pythagorean Fuzzy set. *Complex & Intelligent Systems*, vol.5, no.2, pp.101–111. 2019, doi: <https://doi.org/10.1007/s40747-019-0114-3>
- [3] F. Feng, H. Fujita, M. I. Ali, R. R. Yager and X. Liu , "Another View on Generalized Intuitionistic Fuzzy Soft Sets and Related Multi-attribute Decision-Making Methods", *IEEE Transactions on Fuzzy Systems*, vol.27, no.3, pp. 474 – 488, 2019, doi:10.1109/TFUZZ.2018.2860967
- [4] T.-Y. Chen, "Multiple Criteria Group Decision Making Using a Parametric Linear Programming Technique for Multidimensional Analysis of Preference under Uncertainty of Pythagorean Fuzziness", *IEEE Access*, Vol.7, 2019, doi: 10.1109/ACCESS.2019.2957161
- [5] Cetinkaya, Ali Sukru and Rashid, Muhammad, "The effect of use of social media on employee job performance", Munich Personal RePEc Archive, 2019, <https://doi.org/10.34231/iuyd.437726>

- [6] N. Rahman, J. Arora & I. Kularatne, "Employer's perceptions of using social media for recruitment", *Journal of business and management*, vol.5, no.1, pp.1-12, 2014, <https://uunz.ac.nz/wp-content/uploads/2018/07/2014JanJun1.pdf>
- [7] Vetrakova, Milota & Hitka, Miloš & Potkány, Marek & Lorincová, Silvia & Smerek, Lukáš. Corporate Sustainability in the Process of Employee Recruitment through Social Networks in Conditions of Slovak Small and Medium Enterprises. *Sustainability*, 10 (5). doi: 10.3390/su10051670.
- [8] Faijun Nahar Mim, Md. Ashraful Islam, and Md. Ashraful Islam Gowranga Kumar, "Impact of the use of social media on students' academic performance and behavior change", *International Journal of Applied Mathematics*, vol.3, no.1, 2018, doi: <https://www.mathsjournal.com/pdf/2018/vol3issue1/PartD/3-1-29-778.pdf>
- [9] Maja Pivec and Anita Macek, "Employment background influence on social media usage in the field of European project management and communication", *Journal of Business Research*, vol.94, pp. 280-289, 2019, <https://doi.org/10.1016/j.jbusres.2018.03.021>
- [10] Akashdeep bhardwaj, vinay avasthi, and sam goundarl, "Impact of social networking on Indian youth – A Survey", *I.J. of Electronics and Information Engineering*, vol.7, no.1, pp.41-51, 2017, doi: 10.6636/IJEIE.201709.7(1).05)
- [11] Md. Al-Amin, Shohel Md. Nafi, and Md Al Amin, "Use of social media for job search and application: a perspective from the job seekers in Bangladesh", *Research gate*, vol.55,no.281,2019,https://www.researchgate.net/publication/334736310_Use_of_social_media_for_job_search_and_application_a_perspective_from_the_job_seekers_in_Bangladesh
- [12] Gilbert M. Talaue , Ali AlSaad , Naif AlRushaidan , Alwaleed AlHugail, Saad AlFahhad, "The Impact of Social Media On Academic Performance of Selected College Students", *International Journal of Advanced Information Technology (IJAIT)* Vol.8, no.4/5, 2018,https://www.researchgate.net/publication/328836474_The_Impact_of_Social_Media_on_Academic_Performance_of_Selected_College_Students.
- [13] Koch, T., Gerber, C., & De Klerk, J.J. , "The impact of social media on recruitment: Are you LinkedIn? ", *SA Journal of Human Resource Management/SA Tydskrif vir Menslikehulpbronbestuur*, Vol.16, 2018, <https://doi.org/10.4102/sajhrm.v16i0.861>.
- [14] Marieke Carpentier1, Greet Van Hoyer and Qingxiong Weng, "Social Media Recruitment: Communication Characteristics and Sought Gratifications", *Front. Psychol*, 2019, <https://www.frontiersin.org/articles/10.3389/fpsyg.2019.01669/full>.
- [15] Md. Sajjad Hosain, Abu Hena Mohammad Manzurul Arefin and Md. Altab Hossin, "E-recruitment: A Social Media Perspective", *Asian Journal of Economics, Business and Accounting*, Vol.16, no.4, pp: 51-62,2020, <https://www.journalajeba.com/index.php/AJEB/article/view/30248>.
- [16] Md Sajjad Hosain & Ping Liu, "Asian Journal of Management Recruitment through LinkedIn: Employers' perception regarding usability", *Asian Journal of Management*, Vol.11, no.1, pp:54-60, 2020, https://www.researchgate.net/publication/340412102_Asian_Journal_of_Management_Recruitment_through_LinkedIn_Employers'_perception_regarding_usability
- [17] Md Sajjad Hosain & Ping Liu, "The Role of Social Media on Talent Search and Acquisition: Evidence from Contemporary Literature", *Journal of Intercultural Management* Vol. 12 , no. 1, pp. 92–137, 2020, <http://joim.pl/wp-content/uploads/2020/03/joim-2020-0034.pdf>.
- [18] Pankaj Chaudhary, Abhishek Tyagi , Arvind Viswakarma, "A Review on Recruitment through Social Media Networking Sites", *International Journal of Scientific & Engineering Research* Vol. 8, no.10, 2017, <https://www.ijser.org/researchpaper/A-Review-on-Recruitment-through-Social-Media-Networking-Sites.pdf>.
- [19] Namita Ruparel , Amandeep Dhir , Anushree Tandon , Puneet Kaurf , Jamid Ul Islam, "The influence of online professional social media in human resource management: A systematic literature review", *Technology in Society*, 2020, <https://www.sciencedirect.com/science/article/pii/S0160791X1930689X>.
- [20] <https://data.world/ahalps/which-social-media-millennials-care-about-most>.