The Impact of Social Media on the Personality Trait of Undergraduates students: A Descriptive Analytical Approach

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Abstract: Personality development of an individual is a continuous process that involves multiple methods and techniques. Study on a person's personality is conducted by examining inherited and adopted personality traits during their life span. Higher education institutes play a vital role in flourishing student's personality and significant revolution is noticed by the researchers in this regard. Individual's personality is being affected by use of social media including Facebook, Twitter, LinkedIn and many more. Facebook (FB) is widely used as an online social network to communicate with other individuals. It is observed that students are also users of FB for learning, interacting, recreating and browsing purposes. Our research falls in the same dimension to study student's personality traits through their FB use and eventually analyze the change in their personality. For the same, four higher education institutes of Pakistan located in Lahore are targeted. Data is collected for five years from under graduate students from 2015-2019. It has two main purpose; firstly, to present analytical results and secondly, to examine the changes in person's personality traits (PT) during degree program at the university. Data is collected from FB profiles through an application and Big Five Personality Trait model is used to conduct personality assessment. Five PT are studied namely; extraversion, agreeableness, openness, conscientiousness, and neuroticism. Results interpret the direct relationship of the personality trait with the use of FB and it has shown increased impact on student's personality over the progress of the degree program. Students of all four universities came up with almost identical results that depict the similar role of an institute in the development of the student's personality. Research findings contribute towards data science by proving analytical data on student's personality traits. Also, it acts as guide for educational institutes to deeply cope with targeted PT of a student. Eventually, it facilitates the students to use OSN more effectively in development of their positive personality.

Keywords: Personality traits; Facebook attribute; Openness; Conscientiousness; Extroversion; Agreeableness; Neuroticism;

I. INTRODUCTION

Data science is the study of data. It helps in development of methods for analyzing, storing, and recording data so that useful information can be extracted effectively. Its goal is to gain insights and knowledge from any data type (structured and unstructured) to conclude in effective decision making. Data scientists use various statistical techniques such as descriptive statistics, inferential statistics, probability analysis, hypothesis testing, correlation and regression to study different forms of data and reach to meaningful decision [1].

Data science in social media is very popular in today's time because of existence of plenty of Social Media platforms and their connection with millions of users. Facebook is among the most widely practiced social media network and is extremely popular in all age groups of males and females. Facebook data is large-scale, global and quantitative in nature and it is of utmost interest of data scientist to study it in-depth to derive fruitful outcomes. Our observations directly inform decision-making to improve the daily experiences of people on Facebook, make usage easier and more intuitive and find ways to facilitate meaningful social interactions [2].

Facebook profile is an important tool to reflect human personalities [3]. The word "personality" actually derives from the Persona Latin word, which stands for the theatrical cap to represent different roles of a performer. Hall and Linsey reported that there are many interpretations of personality, as different theorists interpreted it differently [4]. Moreover, we usually describe personality as the collection of traits or characteristics, such as behaviors, feelings, thought patterns, and emotions that are distinctive to a person. Emerge of social networking sites brought vast opportunities for marketing and socializing but also learning and sharing knowledge. In beginning, Social media was used for communication and interactions only [5]. Subsequently, a massive number of users commenced using Social media for updating ideas, recruitment, marketing, information sharing, and knowledge generation. They allow users to make their profiles, interact, connect, and collaborate [6].

Personality has a considerable influence on how we interpret, feel, think, and respond towards the people around us in the world. Its assessment could be used to make decisions about people. It is utilized in many applications, surveys, evaluations, and behavior studies like marketing, advertisement of different products, creating user-centered

environments and so on. Moreover, it is examined by the psychologists to treat several mental and personality disorders. Also, it plays a vital role in a student's learning as educational grounds greatly depends on his/her personality [7]. Various methods are adopted for the personality assessment, like a long questionnaire, which is of course a time-consuming activity. Similarly, many identical studies have been conducted that focus on the statistics of a person about how much his presence is on social media. Roberts's eta al suggested that qualities of personality could affect occasions in life, such as work-related fulfillment [8, 9]. Social media is also raising awareness in people in terms of their interaction with each other. Most of the students use Facebook, Twitter, or Instagram for grooming their personality [10, 11].

This present study is conducted to find out the relation between personality and attitude towards the use of Facebook among undergraduate students. To observe the effect of social media on the personality of undergraduate students, Big 5 personality traits are studied. The increasing convergence among computer sciences and social sciences has influenced researchers to make automated methods to collect and inspect these 5 traits to describe personality [12]. The big five personality model is more precise and sustainable to determine the behavior of humans. The basic concept of this model is to determine the personality characteristics of individuals.

The personality traits are conscientiousness, openness to exploit, agreeableness, neuroticism, and extroversion [13] which are selected for our study. Our objective is to determine the idea of personality traits in an explanatory way and to define the main behavioral patterns to distinguish people or to compare them. However, a rough belief is that the use of LinkedIn and Facebook combine provides improved results as compared to single-use of Facebook or LinkedIn [14]. But our sample population consists of university students and students mostly do not use LinkedIn. So that's why we only use Facebook for data collection. Our exploration work aims to discover an online social network (OSN) for the determination of behavior calculation. According to the Nielsen Company Report on Social Media (2010), the total time spent on social media of individuals is increasing while the time spent on email is decreasing [15].

The present world has become a small community because of social media. Personality is a leading factor in understanding what people behave on the Internet. This connection between personality and Internet usage has represented through several different personality theories [16]. The big five models provide a conceptual framework that summarizes most of the research findings in terms of psychological distinction in individual's personality [17]. It is the most accepted personality model to predict human behavior by investigating the correlation between personality aspects and different social behavioral concerns. Researchers measure big five traits for ease of use, accuracy and convenience [18]. This model was explored and described to subsume well familiar personality traits.

We analyzed the associations between the personality of users and the attributes of their Facebook profiles, like the size and density of their network of friendships, number of groups, number of events attended, photos uploaded, and how many times the user was tagged in photos [19, 20]. This will yield in predicting personality change over period of time within same institute and also to have comparative analytical look on various institutes for the personality modification for under graduating students aging from 20 to 30.

Social media has become rapidly popular among peoples with two billion accounts and millions of online users' every time. The interaction of peoples with each other is revolutionized by social media. Every day, millions of people share their thoughts, activities, emotions, and feelings [21]. The students spend more time on social media for social content and also for educational purposes. The youngsters, especially the students are more exposed to environmental factors. The students from different educational institutes have different types of attitudes and behaviors. Social media has shown remarkable impact on the personality of undergraduate students [22]. Facebook profiles can be used as an active tool to study personality of a person by the way he interacts with other people and hence can be helpful in analyzing inhibited personality traits within them [23]. The convergence among computer sciences and social sciences has guided researchers to make automated methods for collection of data (focused on personality traits) and eventually draw the conclusion about the person.

Personality is a combination of characteristics or qualities that form an individual's distinctive character. The students from different educational institutes have different types of attitudes and it varies with passage of time till they end their degree program at the university [24, 5].

This research is intended to study the behavior of undergraduate students to predict about their personality. For the same, one of the most widely used social networking platforms of Facebook is used. Quantitative data derived from Facebook attributes will be studied against personality traits to assess personality of the student. Also, we intend to study this behavior analysis to find the trend that students develop in their personalities after admission in a university. So, this will help to analyze role of an institute in development of the personality of the student by improving personality traits.

Students experience major changes in their personality during their graduating study program at the university. Also, this is linked with social media usage. Students from the age in range of 20-30 are active users of OSNs and they access it for education, learning, entertainment and interconnecting purposes. Facebook is among top used OSN among under graduating students. Facebook profile serves an interactive tool to obtain data for personality assessment. Our research will study personality traits of the under graduating students through Facebook profiles and find the changes in their personalities. Study is targeting four renowned universities of Lahore, Pakistan and eventually will provide comparative results of the personality trends in the respective university student. Selected universities are Commission on Science and Technology for Sustainable Development in the South, Pakistan (COMSATS), University of Central Punjab (UCP), University of Management and Technology (UMT) and Bahria University (BU). We intend to perform analytical

study and that is the reason to choose five-year data for our research [4].

II.   LITERATURE REVIEW

Personality has a significant influence on how we understand, think, act, and react to other persons. It acts as a theatrical mask to project a performer's various roles [25]. Moreover, we usually define personality as the combination of traits or characteristics, such as emotions, thought patterns, feelings, and behaviors that are special to an individual. Traits are intrinsic and stay consistent throughout life, especially after adulthood [25]. However, slight changes are noticed with the help of therapists for an individual's improvement of personality [26]. The main sixteen characteristics elements depicted in Cattell's personality hypothesis are as follows:

Abstractness: Conceptual versus practical
Apprehension: Feared versus confident
Dominance: Strong versus Submissive
Emotional stability: quiet versus high-stringing
Shifting openness: Adaptable versus familiar
Liveliness: Chaotic versus modest
Privacy: Openness versus discreet
Perfectionism: undisciplined versus controlled
Motivation: Obscure versus concrete
Self-reliance: Autonomous versus dependent
Sensitivity: tenderness versus tough-mindedness
Rule-consciousness: Conformation versus non-conforms
Social boldness: boldness versus shyness
Tension: Comfortable versus Inpatient
Watchfulness: doubtful versus confident
Warmth: Escape versus restricted

A. Eysenck's three dimensions of personality

Another case to identity characteristic hypothesis is Eysenck's three measurements of personality. This hypothesis was proposed by British analyst Hans Eysenck and it has three inclusive characteristics [27]. He accepted that numerous characteristics are innate can be formed by developmental powers. These three characteristics are sufficient to characterize a person's characteristics and are given underneath [27].

B. Introversion/Extroversion:

Introversion includes pointing consideration closer to the internal studies of a person. Introverts tend to turn inward and consciousness extra on the internal mind, moods, and feelings in preference to in search of outside stimulation from their surroundings [28]. They decide upon spending time on their own, typically avoid social gatherings, and are commonly quiet and reserved. Conversely, extroversion involves an interest in the outdoor world. Extroverts are considered sociable, outgoing, generally tend to have greater buddies, and like to spend their time with groups of humans instead of staying by myself [29].

Emotional stability/neuroticism: This characteristic was analyzed by Eysenck on the scale of moodiness and even self-esteem. Neuroticism refers to the tendency of a person to be emotionally unstable, and easily get upset. Low neuroticism shows a stable and calm attitude.

C. Gordon Allport's trait theory

In 1936 psychologist Gordon Allport found an English dictionary composed of over 4000 words [27]. Such terms are related to various personality characteristics and may help assess the actions of an individual. Those personality traits he grouped into the following classifications:

Cardinal characteristics: These traits can control the complete life of a person to the degree that the individual is recognized absolutely to identity individuals. In any case, cardinal characteristics are rare and develop late in life [30].

Central characteristics: A person's common highlights that make up the establishment of their nature can be portrayed utilizing the Central characteristics. These qualities are not considered as driving as cardinal characteristics. For case, legitimate, untrustworthy, modest, on edge, etc. can be utilized to depict an individual. CC are ordinarily natural characteristics that are troublesome to alter afterward in life.

Secondary characteristics: They appear in a particular circumstance or beneath a few conditions e.g., getting on edge once standing in line or getting anxious whereas talking to bunches. These characteristics can be progressed with practice and psychiatric offer assistance [31-38].

D. Hamburger's Approach

In 2013, Hamburger pointed out HEVREA: A nostalgic website online personality survey on 100 Students, where 50 students were users of HEVREA and 50 were not heavy users of HEVREA. Hamburger explored that usage of nostalgic websites is not affected by extroversion. [39] Published a study suggesting that an individual's pattern of Internet usage and their personality is related. He suggested that every person has a different pattern of usage of these networks which is influenced by the personality of that person. The majority of the student spends time on social media for information content, creating knowledge, file sharing, chatting, entertainment, enjoyment, and also for online discussions. An individual's success mainly depends upon its personality. Success in professional and academic careers such as the job market, gaining support, and finding a partner largely depends upon the personality and social background [40-52]. Personality is a solid predictor of a person about studies, marketing, and job performance. The personality-performance relationship is across all academic performance, managerial levels, and occupational groups. The current study directs to assist the literature by assuming the relationship between occupational characteristics and personality.

E. The Big Five Personality Model

Personalities are complex systems of behaviors, thoughts and feelings describing how we interact with others and the world around us. The Big Five traits that covers these five "core" personality traits is one of the most popular and accepted systems, namely; extroversion, agreeableness, openness, conscientiousness, and neuroticism.

It is also known as the five-factor theory of personality, which is the most important and widely accepted theory.

F. Openness

Openness is usually affection of art, excursion, aesthetics, imagination, emotion enthusiasm as they are intrigued about the world, have extraordinary ideas, and also have a wide range of interests. Openness imitates a tendency or level of intellectual curiosity, art, novelty, creativity, and diversity a person has. It also defines the range of imagination and independence that a person comprises. Here, imagination does not mean that a person is not realistic but that he/she is open to considering new ways of doing things. They know how to balance between existing and new approaches. However, there are some disagreements between theorists about how to interpret openness, which is sometimes referred to as intellect [32]. People with a high degree of openness tend to be imaginative and liberal in their opinions and thoughts. Poets and artists may be considered as typical examples of high openness scorers.

G. Conscientiousness

It reflects a person's ability to act dutiful, responsible, organized, and self-disciplined. They aim for achievement and generally have very high standards for work. Conscientious people prefer to be organized and well prepared rather than being spontaneous [33]. They have a strong sense of direction, and self-control at work and in their personal life as well.

H. Extroversion

Extroverts are outgoing and sociable whereas introverts prefer to spend their time alone and are generally considered reserved. However, this does not conclude that introverts are unfriendly and suffer from social anxiety; they just do not seek external opportunities for excitement. Extroverts are more active, energized, and optimistic [33]. Although they prefer group settings and want to be surrounded by people, they also maintain their privacy.

I. Agreeableness

It can be defined as the capability to be kind hearted and supportive rather than being doubtful and opposed to others. It also covers an individual's believing and cooperative nature. People displaying this personality dimension are friendly to almost everyone and are always ready to help. They possess the primary facets of trust, modesty, forwardness, and tender-mindedness. Agreeable people are best known for their warm and tolerant behavior.

J. Neuroticism

It is the emotional and mental stability of a person under adverse situations. People who score high on neuroticism can be very sensitive to a stimulus and become nervous easily in a stressful situation. They also suffer more from anxiety. Conversely, individuals who score lower on neuroticism are considered consistently calm and stable. Instability of emotions can sometimes result in feelings of guilt, anger, mental stress, and anxiety. It is believed that people with high neurotic scores tend to have more heart attacks and psychological disorders than those who have a low neurotic

methods like impression management, Linguistic Feature Extraction, Survey instrument, and SEM-neural network

score. This indicates that neurotic individuals tend to have a high range of negative emotions.

K. Personality Characteristics

There exist many researches works that combine the personality characteristics to social behavior. They observed some signs that the nature of a person and the way he possesses his social media presence is surely interrelated. For instance: individuals who have a high degree of neuroticism are more addicted to social media like, Twitter, LinkedIn, Facebook, and blogs [34]. Amichai-Hamburger and Ben-Artzi published research that tells that personality is somehow related to the use of the Internet [35]. They examined the impressions of the Internet usage of many different males and females with Extrovert and Neuroticism qualities and found that males showed positively more tendency towards leisure services for extroversion, while neuroticism was negatively associated with info services. On the other hand, females showed opposite results. These consequences are significant because they show that personality is an important and extremely related aspect of social media behavior analysis. Amichai-Hamburger et al. studied that there is a connection between nostalgic websites and personality. This study says, that extroverts were fonder of the nostalgic websites as compared to introverts [36]. Moreover, the authors indicated that the social interaction of the users is much similar to the behavior.

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L. Personality Assessment and OSN's

Recently, a rigorous growth has been seen in the use of OSNs. OSNs are making anincreasingly important influence on our daily lives. They have become a popular mediumof communication and they allow users to share their daily life information and receiveupdates from friends and favorite celebrities. According to divergent views, OSNs can be an entire social context in which to demonstrate individual personality characteristics and further develop precise relational perceptions [39].

The OSN profile comprises crucialinformation that can be used to identify the behavioral pattern of a user. The interaction of peoples with each other is revolutionized by social media. Every day, millions of people share their thoughts, activities, emotions, and feelings, etc.Kosinski, R. Lambiotte, and Michal suggested that every person has a different pattern ofusage of these networks which is influenced by the personality of that person [40]. Furthermore, previous studies on personality assessments have used various

modelling to understand the effect of social media on student's academic qualification [41].

Another study used My Personality operation data to study the personality-digital footprint relationship [42]. It used different language evaluation to detect distinct features of demographic and psychological characteristics to 700 million phrases, words, and subject instances which were gathered by my personality application from 750 users ' Facebook status updates [43]. The accuracy of the personality predictions is moderate in this research. According to the Nielsen company Report on Social Media (2010), the total time spent on social media of individuals is increasing while the time spent on email is decreasing [44]. Overall, personality assessment is directly measured by use of social media by different individuals.

An individual's success mainly depends upon its personality. In 2016 James At. Eaton [49] Success in the professional and academic career such as job market, gaining support, and finding a partner largely depends upon the personality and social background. Personality is a solid predictor of a person about studies, marketing, and job performance.

M. Personality Assessment through Facebook

Back et al. proposed that Facebook profiles reflect the actual personality of users. The impression has a big effect on social life (personality) and also on the academic qualification. Today, Facebook is the most widely used and liked social media. According to Danny Azucar 2018, Facebook has around 2 billion accounts and almost 1250 million users log on to Facebook on daily basis [46]. In addition to these studies, as per a statement by Alpha-Pro on social media update in Jan-2018, 92% of people who use the Internet is actively using Facebook sharing information. Individuals share their opinions, events, satisfactory, and other day-to-day life routines on these social media sites, that are reasonably beneficial in temperament examination both renting an apartment and tuition fee for school [46].

Studies have found renowned transformation in human communication activities, interactions, and socialization towards on-line channels that indicates individual's interest towards OSNs. Also, it is found that Facebook takes top rank in popularity and usage by individual throughout the world. Data scientists are interested in data obtained through Facebook profiles for numerous decision-making tasks [47]. Individuals can observe their personality that relies on two main things, firstly, a user personality reflects by their Facebook Profile, and secondly other features of the accounts to observe other personalities. At the same time, some irrelevant features from the account and profile can be used for false judgment too [48]. Recently, a rigorous growth has been seen in the use of FB-OSNs. The emerging trend brings vast opportunities for marketing and socializing and also for learning and sharing knowledge. So, it concluded that these social media platforms, particularly Facebook, can be accurately used for the determination of behavior study [49].

Danny Azucar et al.in 2018 used Facebook Automatic Scrapping for an unsupervised personality prediction tool named Pear was used to assess personalities. General public Personality prediction accuracy is expressed using Pearson's r found that some people believe in fake news and their personality patterns are different from others [53-58].

Shelly Bhardwaj et al. explore Facebook and Twitter Automated using the My Personality app. He used the questionnaire and Pearson's correlation to check accuracy. Data of 31 participants have collected and found that use more social sites are more open while people who use fewer social sites are more conscious [59]. Five factors Model of Personality Assessment is having its own importance and impact in behavioral analysis (FFM) [60]. This model was explored in and described to subsume well familiar personality traits. The big five models provide a conceptual and nomenclature framework that summarizes most of the research findings in terms of psychology individual difference distinction and personality. Also, old research found the correlation of personality with different aspects of life such as happiness, marital satisfaction, job success, and attractiveness.

TABLE I. Previous studies on personality assessment

Study reference	Data source	Tool/ technique	Study population	Contribution
Amichai-Hamburger *et al.* (2010) [39]	HEVREA: A nostalgic website	Online personality survey	100 Students, 50 were heavy users of HEVREA, 50: not heavy users of HEVREA.	Explored that usage of nostalgic websites is not affected by extroversion.
Ross *et al.* (2011) [40]	Facebook	Online personality survey	97 students. 15 men and 82 women, having an average age of 21.69 years	Found that extrovert people have joined a greater number of groups while more wall posts are uploaded on Facebook by neurotic people.
Verschuren, (2012) [51]	LinkedIn	Multiple online personality surveys. and analyzed by psychologists	62 students (35 women and 27 men, mean age 23.11 years) at Tilburg University	Two studies were conducted, level of extroversion was high in both. psychologists found that it is easier to measure extroversion from LinkedIn data in comparison with other personality traits.

Shelly Bhardwaj *etal.* (2015) [59]	Facebook and Twitter	Automated using My Personality app. Also used questionnaire. and then Pearson'scorrelation was used to check accuracy.	Data of 31 participants were collected.	People who use more social sites are more open while people who use fewer social sites are more conscious.
ManilVaidhya (2017)	Facebook	My personality project questionnaire	250 users	Personality Traits Analysis From Facebook Data
Danny Azucar et al. (2018) [53]	Facebook	Automatic using Scrapping Tool. An unsupervised personality prediction tool named Pear was used to assess personalities.	General public	Personality prediction accuracy is expressed using Pearson's r. found that there are some people who believe in fake news and their personality patterns are different with others.
Hans-Werner Bierhoff (2020)	Facebook	Self-Esteem Scale (RSES) and Sensation Seeking Scales, Form V (SSS-V)	Universities Participants 254	The Narcissistic Millennial Generation: A Study of Personality Traits and Online Behavior on Facebook

III. METHADOLOGY

The proposed methodology framework is represented in Fig. 1 and Fig. 2 that consists of following steps:

Data Collection (Data collected from Facebook profiles) and converted to desired information under study
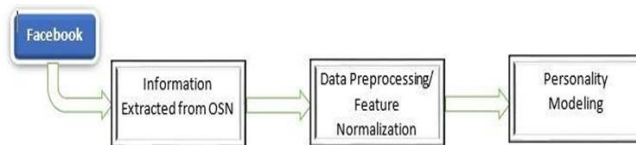
- Pre-processing of data
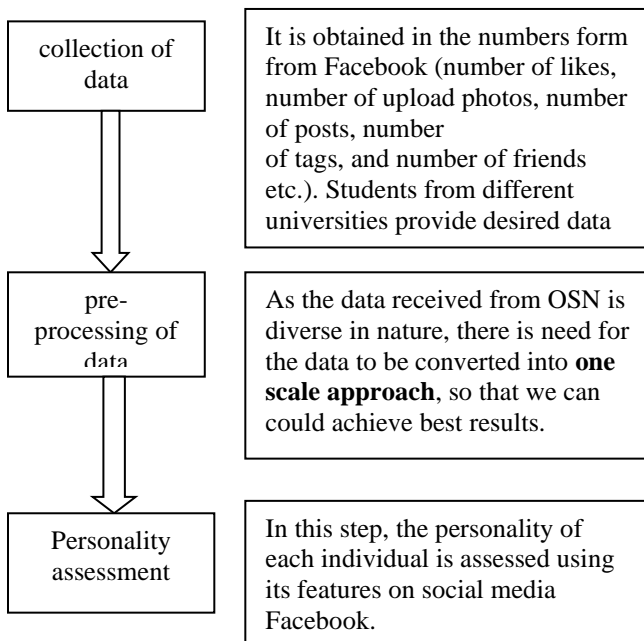- Personality assessment

Figure 1. Framework of study

Figure 2. Detailed Framework

A. Data Collection

Most crucial step was data collection. For this purpose, first of all an application was developed that could gather user's required data for the study (Fig. 3). Through Social Circle, we collected the user information uploaded to Facebook and used a fire-based database to store data gathered through the social circle application. We developed an android-based app to collect user data using JAVA and XML.

The app was then integrated with the Facebook Graph API and the database on the firebase. After development of Application, it was integrated with Facebook. Then, user was registered as tester on FB to gather his/her data and finally application was installed on user's android phones.
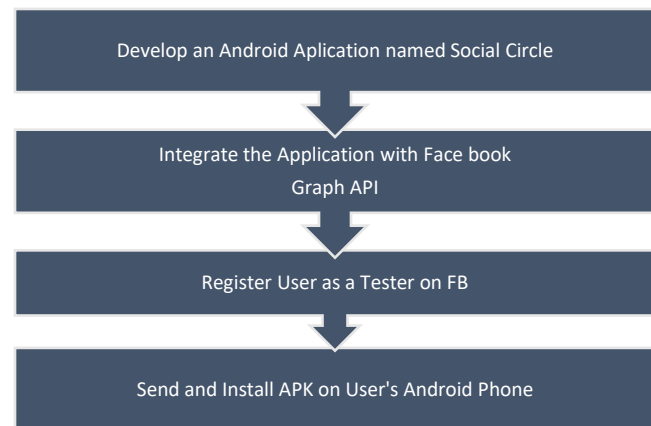

Figure 3. Initial Step of Data Collection; Development of Application

Data was collected from 382 people from different universities. Each of them had either completed their degree or final year students. Participants were aged 21 to 28, both females and males. We conjured people from various fields of study to bring variety in the data collection process. During

data collection, the names of a large number of members were kept secret.

Steps for individual's data collection are as follow:

1. Send the social circle APP to the user and asked the user for app installation.

2. User fills out Performa on APP and click next, and then press Facebook to start

3. Facebook requires permission from users and generates an access token.

4. Public user profile data moved to the social circle app from Facebook and stored in the fire database.

TABLEII: Selected Facebook attributes for personality assessment

Attribute Label	Attribute Name	Attribute Description
y_{21}	Number of friends	We assume that y11 be correspondent to extroversion and agreeableness because Social people like to make new friends and meet people [28]. Additionally, this attribute is really important to study as number of friends directly reflect person's supportive nature and personality trait as well. [55].
y_{22}	Number of likes	Person with high openness scores will be more innovative in exploring new things and understanding new developments [25]. As they tend to seek new interests, they get bored easily. Consequently, they usually have more likes on Facebook [23]. People with higher scores in agreeableness, neuroticism, and extroversion have meaningful Facebook likes and that is the reason to select this attribute for our study.
y_{23}	Number of status updates	We assume that people who are extroverted and open should have more posts on social media. Generally, extroverts are more talkative and expressive in their emotion as compared to others [26], [28]. That is why they should reflect positive relationship with the number of posts.
y_{24}	Number of photos	As per our perception, extroverted will have more number of upload images due to their friendly and social nature. They also want to show their life experiences to their friends which encourage them to upload more photographs. On the other hand, conscious peoples want to work more and spend minimal time in online activities because of their restrained and persevering nature [25].
y_{25}	Number of tags	People having more friends definitely receive enhanced tags and it should ultimately score high who score high in agreeableness [25], [56].
y_{26}	Number of events	Extroverted persons have more number of events too and it directly depicts their personality trait.
y_{27}	Number of groups	Normally, Conscious persons have number groups because of their responsible nature towards life matters [56].
y_{28}	Number of games	Number of games has relationship with neuroticism. Neurotics want to spend their energy in games to avoid tension and pressure while Extroverts like to play open-air games more, as compared to web-based games [34].

B. Selection of Facebook Attributes for Personality Assessment

As it was clear from literature review that Face book is one of the most popular social networks used for connecting people. Humans consume more time on FB as compared to any other SN. So, the way people spend their time on FB can be helpful to determine the personality traits of the individual. For the same, TABLE II demonstrates the selected Facebook attributes for our study.

C. Problem Formulation

Here in this section, we will formalize our problem under the principles of data science.

Let H be a function which takes OSN S inputs. Many features like the number of posts, contacts, likes, games etc. are extracted from OSN narrating the user's personality. In this study, we are focusing the most popular OSN which is Facebook.

Let Y be the set of features derived from the OSN that can be described as the union of a set of features derived from the OSN.

Y= {y21, y22, y23, y24, y25, y26, y27, y28}

Where y represents feature and number, i.e. (1-8) in the prefix, represents the number of features (as described in TABLE II).

Z denotes personality traits an individual may have, where Z must be the following personality traits: OPN, EXTR, COS, or AGBR, or NEUT which represents openness, extroversion, conscientiousness, agreeableness, and neuroticism respectively. These five traits depend on the features Y retrieved from OSN, S, Also, each trait is represented with a single value calculated using the H function. The function H takes Y as input and gives personality traits Z, i.e.,

Z=H(Y)

It is worth mentioning that the value of Z is calculated by aggregating all the features of Y by using H function. Relationship between Z and H are studied.

D. Proposed Descriptive Analytical Model for Study

We have adopted Descriptive Analytic Model for study that works in two segments. First section finds out the relationship between personality traits with linked Facebook attribute among four university students. This will find out results together by linking Facebook attribute, personality trait and four selected universities for each year. In second phase, detailed study is performed on personality trait of each university. This is also done year wise to conclude the followed trend among university students under study of our research. Proposed model is shown in the Fig. 4, which shows the time frame from year 2015 to year 2019.
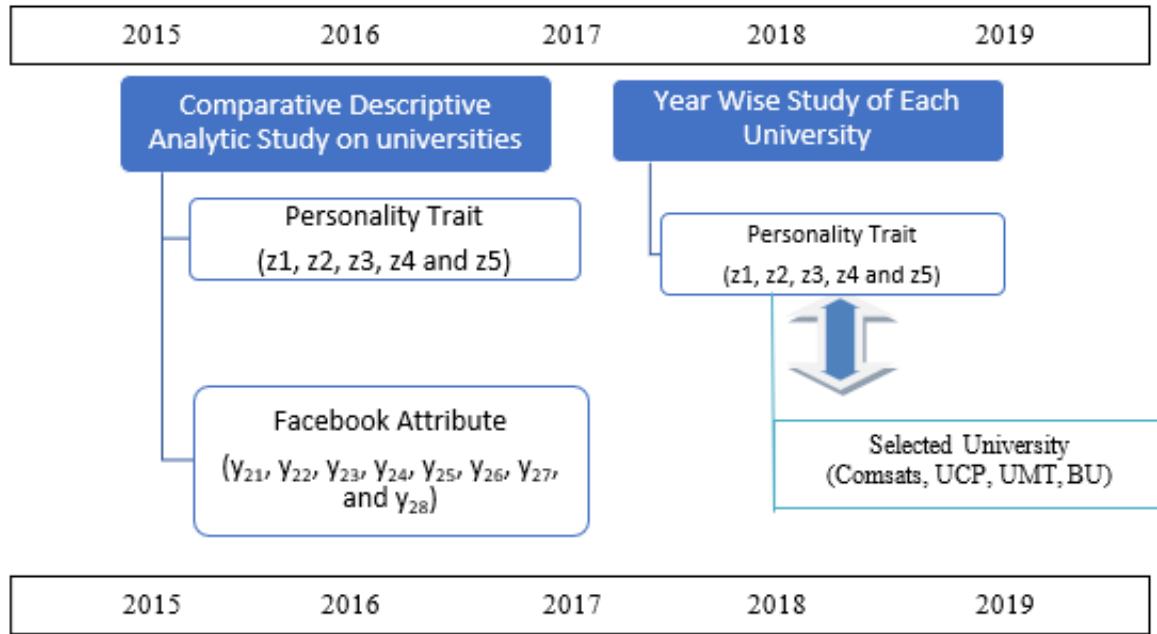
Figure 4. Proposed Descriptive Analytical Model

IV. DATA PROCESSING AND MODEL FORMULATION

Pre-processing of data is a major step in our process. Although the data was in different formats and was distributed into numbers. As the numerical data are difficult to interpret and use. The next phase is to normalize attributes into a single scale.

TABLEIII. List of Facebook Attributes and Features

Feature Label	Facebook Attribute
Y_{21}	Number of Friends.
Y_{22}	Number of Likes.
Y_{23}	Number of Status Updates.
Y_{24}	Number of Photos.
Y_{25}	Number of tags.
Y_{26}	Number of Events.
Y_{27}	Number of Groups.
Y_{28}	Number of Games.

A. Attributes Normalization

Normalized attributes are obtained by using one scale formula. As each attribute ranges from zero to high value., it is important to convert them to identical scale of measurement. To combine several attributes, we used a common estimation scale and normalized them in the value range from 0 and 1. Now, attributes can be compared quantitatively in easy manner. This could be achieved in two ways; Converting each scale to have the same lower and upper levels. Then, making them standardized by expressing scores at standard deviation units. (z-scores).

The steps for normalization are listed below:

in various files. Data conversion into one format was required and then we combine files according to university for good understanding and assessment. As mentioned above, most of the data was in textual form. The first stage was the transformation of the data

As we gathered 5-year data against each attribute.

• Discover maximum and minimum attribute values in 5 years, respectively

$$X' = \frac{X - Min(X)}{Max(X) - Min(X)} \ (NewMax - NewMin)$$

This step is repeated to compute normalized standardized data for all selected features.

Where X' represents normalized feature value. Y is the adjusted variable and X is the original variable, Xmin is the minimum observed value on the original variable and Xrange is the difference between the maximum potential score and the minimum potential score on the original variable and n is the upper limit of the rescaled variable. This conversion can easily be accomplished with a variable transformation in any statistical software.

B. Assessment of personality

An attribute can be associated in different ways to different personality traits. Z represents personality traits an individual might have, Where Z can be one of the following traits of personality as OPN, EXTR, COS, or AGBR, or NEUT which represents openness, extroversion, conscientiousness, agreeableness, and neuroticism. Such five personality traits depend on the attributes Y derived from OSN, S and each trait is represented by a single value,

24

measured using a function H. The function H brings Y as input and provides personality traits Z. For instance, we could say that Z is a set of Five Traits i.e. {Z1, Z2, Z3, Z4, Z5}. For each T, the set of input F for G is different. To understand this, we represent each T with a Trait Name which are shown in TABLE IV below.

TABLE IV. Five Personality Traits

Trait Label	Trait Name
Z1	Openness
Z2	Consciousness
Z3	Extroversion
Z4	Agreeableness
Z5	Neuroticism

The relationship between Facebook use and personality was studied by Yoraam Bachrach et al. Here we introduced openness as Z1 which includes attributes such as number of friends, number of status updates, and number of groups.

To calculate Z1, input set Y for H would be {y22, y23, y27}. Z1 relates with number of friends, number of status updates, number of photos, and number of groups.

To calculate Z2, the set of input Y for H would be {y21, y23, y24, y27}. Z3 shares connection with Facebook attributes, number of likes, number of friends, number of status updates, number of photos, and number of events.

In 2015 Shaly Bhardwaaj [56] observed individual personality via social media online. They examined that agreeable people in their Facebook activities have a greater number of likes and friends. They also discuss that agreeable individuals are friendly to everyone, and are always ready for help. Those which score high on neuroticism can be highly sensitive to a stimulus and can quickly become tense in a stressful situation. Moreover, people who score less on neuroticism are always considered calm and stable. This demonstrates that neurotic people tend to have a higher range of negative emotions [57]. The association between neuroticism and Facebook attributes No of likes, number of friends, and number of tags. They also play games to overcome their emotions [58],[54].

To calculate Z4 the input set Y for H would be {y21, y22, y25}. There is a connection between neuroticism and Facebook features no of likes and number of games.

To calculate Z5 the input set Y for H would be {y22, y28}. Function H computes the year-wise aggregated value of each Personality Trait Z1, ..., Z5 for each university person. In such a way all five personality traits of each person are found in each of the four universities listed. Our goal in universities is to find a year-wise personality trend. We computed the year-wise aggregated value of every personality trait from year to year to discover a trend in each university. Same is represented in Fig. 5 below:
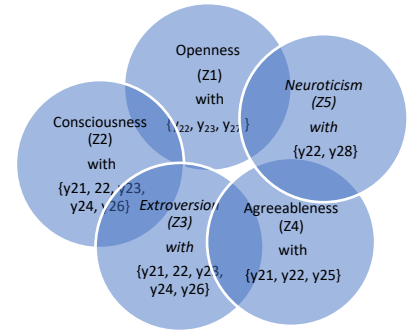

Figure 5. Structure of Proposed Five Trait Model

V. REULTS

This section first elaborates all of the personality traits in the year 2015, 2016, 2017, 2018, and 2019. Then we briefly examined the relationship between the Major Facebook features and big five traits year-wise in the form figures between different universities.

Tables below represents total number of responses collected for each Facebook attribute from each university. This is for the time period from 2015 to 2019. This describes us to have a critic look on the total data collected so that we could analyze the result based on the provided data.

TABLE V. Statistics of Comsats University for year 2015-2019

Statistics	No of Friends	NO OF LIKES	NO OF POSTS	NO OF IMAGES	NO OF TAGS	NO OF EVENTS	NO OF GROUPS	NO OF GAMES
N Valid	84	84	84	84	84	84	84	84
Sum	8121.0	19098.0	12204.0	6748.0	6756.0	2142.0	2832.0	2280.0

TABLE VI. Statistics of BU University for year 2015-2019

Statistics	No of Friends	NO OF LIKES	NO OF POSTS	NO OF IMAGES	NO OF TAGS	NO OF EVENTS	NO OF GROUPS	NO OF GAMES
N Valid	92	92	92	92	92	92	92	92
Sum	7229.0	32469.0	14707.0	7511.0	7969.0	2169.0	2917.0	2273.0

TABLE VII. Statistics of UMT University for year 2015-2019

Statistics	No of Friends	NO OF LIKES	NO OF POSTS	NO OF IMAGES	NO OF TAGS	NO OF EVENTS	NO OF GROUPS	NO OF GAMES
N Valid	100	100	100	100	100	100	100	100
Sum	8941.0	20854.0	20545.0	11547.0	9888.0	2177.0	2993.0	2291.0

TABLE VIII. Statistics of UCP University for year 2015-2019

Statistics	No of Friends	NO OF LIKES	NO OF POSTS	NO OF IMAGES	NO OF TAGS	NO OF EVENTS	NO OF GROUPS	NO OF GAMES
N Valid	80	80	80	80	80	80	80	80
Sum	7837.0	17423.0	12100.0	6417.0	6539.0	2146.0	2842.0	2257.0

As per tables V to VIII, UMT students have maximum number of friends, highest number of posts and images, number of tags, number of groups and number of games. Students of Comsats university hit liked button the most among other university students. Also, they have shown highest interest in number of events. Likewise, is the case with frequency indicating that maximum response is collected from students of UMT and minimum from UCP
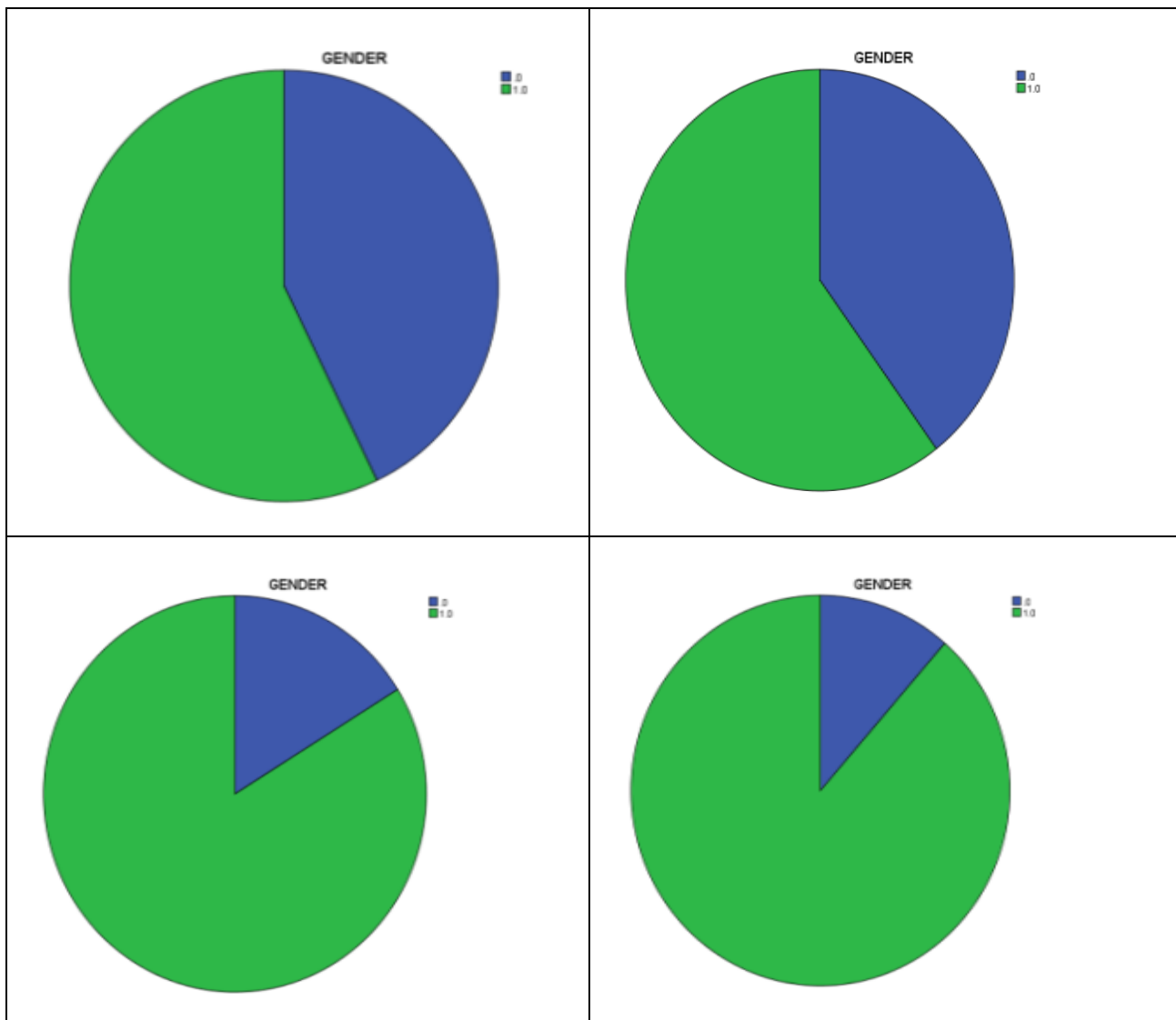
.

Figure 6. Gender representation of Comsats, BU, UMT and UCP in order from L to R)

Our intention is to check relationship of face book attributes on personality traits. For the same, we conducted statistical tests to assess the effect of selected face book attributes on particular personality trait of the university students.

To evaluate Openness, we assumed that independent variables are no. of groups, no. of likes and no. of posts and

will analyze that how they are determining the dependent variable of openness.

We checked the variability through model summary of multiple linear regressions. Here we are interested in r square value.

TABLE IX. Model Summary of Openness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.094ª	.009	-.024	.111167871965299

a. Predictors: (Constant), NO OF GROUPS, NO OF LIKES, NO OF POSTS

For openness, value we get is .094 which is showing weal influence of independent variables towards dependent variable. Let's assess it more through ANOVA.

TABLE X. ANOVA of Openness

ANOVAª

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.010	3	.003	.267	.849ᵇ
	Residual	1.100	89	.012		
	Total	1.110	92			

a. Dependent Variable: Op
b. Predictors: (Constant), NO OF GROUPS, NO OF LIKES, NO OF POSTS

F value indicates that 27% of variability is determined by independent variables in this case.

TABLE XI. Coefficients of Openness

Coefficientsª

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.413	.041		9.972	.000
	NO OF LIKES	-.063	.095	-.070	-.665	.508
	NO OF POSTS	-.035	.089	-.043	-.397	.693
	NO OF GROUPS	.033	.059	.061	.570	.570

a. Dependent Variable: Op

Likewise, is the case with coefficients. No. of likes and no. of posts shows indirect relationship in determining openness and number of groups shows weak relationship in determining IV. So overall, we can predict that these attributes are not showing active influence i8n determination of dependent variable of Openness.

Second personality trait is Consciousness. We assumed that consciousness is dependent upon no. of events, no. of friends, no. of images, no. of posts and no. of likes.

TABLE XII. Model Summary of Consciousness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.171ª	.029	-.022	.145878332520591

a. Predictors: (Constant), NO OF EVENTS, No of Friends, NO OF IMAGES, NO OF POSTS, NO OF LIKES

As per TABLE, value of r is .17 that goes for direct relationship of weak category to calculate the value of consciousness. To have a detailed look on it, we will go for ANOVA test.

TABLE XIII. ANOVA of Consciousness

ANOVAª

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.061	5	.012	.573	.721ᵇ
	Residual	2.022	95	.021		
	Total	2.083	100			

a. Dependent Variable: Co
b. Predictors: (Constant), NO OF EVENTS, No of Friends, NO OF IMAGES, NO OF POSTS, NO OF LIKES

As per TABLE X,57% of variability is being affected by independent variables of no. of events, no. of friends, no. of images, no. of posts and no. of likes. Let's go for coefficients calculation of consciousness.

TABLE XIV. Coefficients of Consciousness

Coefficientsª

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.773	.077		10.015	.000
	No of Friends	.292	1.276	.023	.229	.820
	NO OF LIKES	-.100	.128	-.081	-.781	.436
	NO OF POSTS	-.235	.219	-.110	-1.073	.286
	NO OF IMAGES	.036	.292	.012	.122	.903
	NO OF EVENTS	-.117	.114	-.108	-1.030	.306

a. Dependent Variable: Co

As per above TABLE, all the variables are generating p value higher than 0.05 which actually goes for acceptance of null hypothesis that poor relationship exists between independent and dependent variable in this particular scenario.

For extraversion, we assume that independent variables are no. of events, no. of friends, no. of likes, no. of posts and no. of images.

We will begin with Model summary to find the relationship among dependent and independent variables.

TABLE XV. Model Summary of Extroversion

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.310ᵃ	.096	.040	.070083578352574

a. Predictors: (Constant), NO OF EVENTS, No of Friends, NO OF LIKES, NO OF POSTS, NO OF IMAGES

As per TABLE XV, r value indicates positive direct relationship among independent and dependent variables of intermediate category. Let's do ANOVA to check it in detail.

TABLE XVI. ANOVA of Extroversion

ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.042	5	.008	1.701	.144ᵇ
	Residual	.393	80	.005		
	Total	.435	85			

a. Dependent Variable: Ext
b. Predictors: (Constant), NO OF EVENTS, No of Friends, NO OF LIKES, NO OF POSTS, NO OF IMAGES

ANOVA suggests the F value of 1 which is representing strong dependency of independent variables to determine dependent variable but still, we want to examine the relationship through coefficients to evaluate our conclusion regarding extroversion.

TABLE XVII. Coefficients of Extroversion

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.140	.031		4.570	.000
	No of Friends	-.342	.571	-.064	-.599	.551
	NO OF LIKES	.057	.092	.066	.621	.536
	NO OF POSTS	.081	.119	.085	.679	.499
	NO OF IMAGES	.265	.191	.177	1.393	.168
	NO OF EVENTS	.058	.027	.239	2.172	.033

a. Dependent Variable: Ext

TABLE XVI indicates that in case of no. of events, we can reject the null hypothesis indicating no relationship among IV and DV but case differs for no. of friends, no. of likes, no. of posts and no. of images where p value is more than 0.05. So overall, we see weak dependency on IV in determining DV except of no. of events where see strong dependency in calculation of extroversion by number of events.

Next personality trait is Agreeableness. We will check the dependency of no. of tags, no. of friends and no. of likes on Agreeableness.

TABLE XVIII. Model Summary of Agreeableness

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.154ᵃ	.024	-.013	.109749661316840

As per TABLE XVIII, r value is 0.15 which shows direct positive relationship of IV on DV of weak category. Let's explore more by ANOVA test.

TABLE XIX. ANOVA of Agreeableness

ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.023	3	.008	.643	.590ᵇ
	Residual	.952	79	.012		
	Total	.975	82			

a. Dependent Variable: Agr
b. Predictors: (Constant), NO OF TAGS, No of Friends, NO OF LIKES

As per TABLE XIX, value of F is 0.6 showing around 64% of dependency in variability of DV by IV.

TABLE XX. Coefficients of Agreeableness

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.205	.040		5.165	.000
	No of Friends	.721	.819	.099	.880	.382
	NO OF LIKES	.067	.142	.053	.471	.639
	NO OF TAGS	-.206	.196	-.117	-1.050	.297

As per TABLE XX, p value shows significant figure with less than 0.05 value that actually accepts null hypothesis that independent variables are not playing so important contribution in determination of dependent variable of Agreeableness.

Next variable is of Neuroticism. We assume independent variables of no. of games and no. of likes are contributing towards the achievement of dependent variable of Neuroticism.

Let's start the dependency with model summary.

TABLE XXI. Model Summary of Neuroticism

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.951ᵃ	.905	.902	.050172484267306

a. Predictors: (Constant), NO OF GAMES, NO OF LIKES

R value of 0.95 suggests strong relationship of independent variables on dependent variable.

TABLE XXII. ANOVA of Neuroticism

ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.914	2	.957	380.230	.000ᵇ
	Residual	.201	80	.003		
	Total	2.116	82			

a. Dependent Variable: Neu
b. Predictors: (Constant), NO OF GAMES, NO OF LIKES

F value is significant to show variability of IV on DV.

TABLE XXIII. Coefficients of Neuroticism
Coefficientsᵃ

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	.037	.013		2.916	.005
NO OF LIKES	.506	.064	.273	7.882	.000
NO OF GAMES	.451	.017	.931	26.932	.000

a. Dependent Variable: Neu

P value also suggests that strong relationship exists in determination of DV by IV.

A. Personality traits in 2015

As the research is Descriptive Analytic in nature, detailed study is conducted from the year 2015 to 2019 for the personality traits of undergraduate students of four universities.

This section describes the main five personality traits according to different university students participating on social media Face book in 2015. The personality traits between universities in 2015 are explained below.
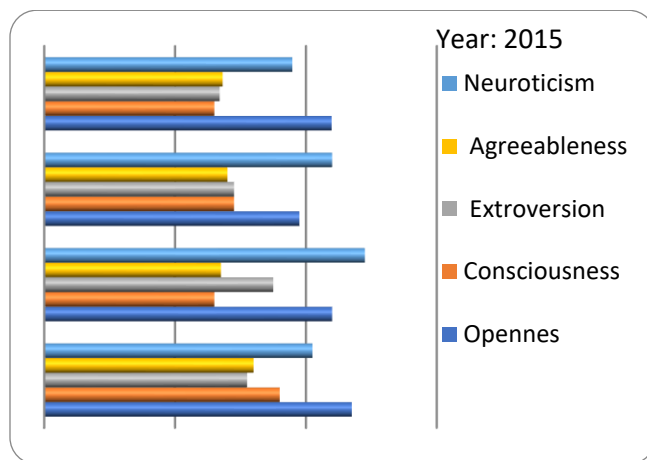
Figure 7. Personality traits in 2015

Fig. 7 determined the openness of each university in 2015. The openness trend was highest among Comsats university students in 2015 and a lower rate of openness was reported this year between the UCP students. Facebook attributes y21, y23, y24, and y27 were used to find consciousness.

The graph figure indicated that the Consciousness trend was highest in the Bahria university students in 2015 and a lower rate of Consciousness was reported this year among the UMT students. Facebook's attributesy21, y22, y23, y24 andy27, and y28were used to find Extroversion.

 Extroversion trend was highest in UMT university students in 2015 and a lower rate was reported this year between the Bahria university students. Facebook attributesy21, y22 andy25were used to find Agreeableness

and it described that the Agreeableness trend was highest among the Comsats university students in 2015 and a lower rate of Agreeableness was reported in Bahria university students.

Facebook's attributes y22 andy28were used to find Neuroticism between different University students representing highest score in UMT university students in 2015 and a lower rate of Neuroticism was reported this year among the Bahria university students.

B. Personality traits in 2016

This section describes the five big personality traits according to different university students participating on social media Facebook in 2016. The personality traits among universities in 2016 are explained below.

Fig. 8 shows the openness of each university in 2016 defining that the openness trend was highest in Comsats students in 2016 and a lower rate was reported this year in UCP students. Also, consciousness trend was highest in UMT university students and a lower rate was reported this year in UCP students.

The graph showed that the Extroversion trend was highest in Comsats university students in 2016 and a lower rate of Extroversion was reported this year in Bahria university students. It also identified that Agreeableness trend was highest in Comsats university students in 2016 and a lower rate of Agreeableness was reported this year in UCP university students.

Neuroticism trend was highest among the Comsats university students in 2016 and a lower rate of Neuroticism was reported this year among the UMT university students.
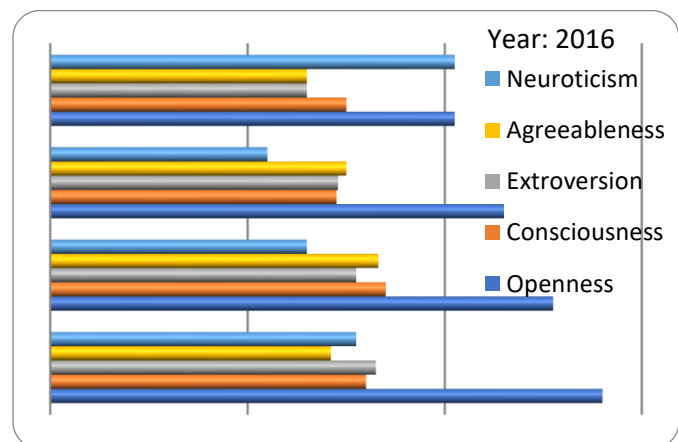

Figure 8. Personality traits in 2016

C. Personality traits in 2017

This section describes the main five personality traits to different university students participating on social media Facebook in 2017. TABLE XXVI lustrates personality traits in 2017.

As per Fig. 9, openness trend was highly observed in Comsats students for the year 2017 and a lower rate was reported in UCP students.

The consciousness trend was highest in UMT university students and a lower rate was reported in this year in Bahria

university students. Extroversion was highest in UMT university students in 2017 and the lowest in UCP university students. The agreeableness trend was more observed in the Comsats university students in 2017 and a less in UCP and UMT university students.

Neuroticism trend was highest in UCP university students in lowest rate were reported this year among the UMT university students.
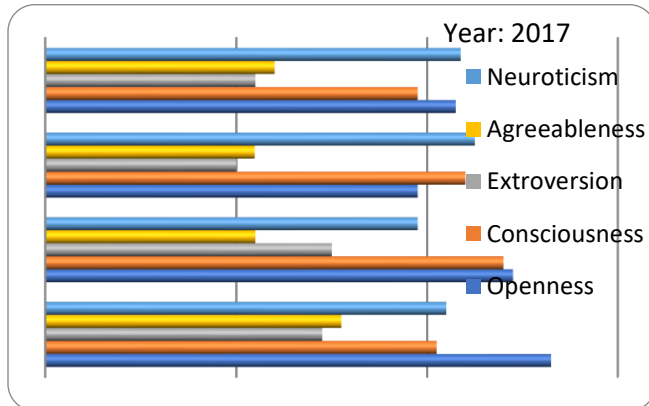

Figure 9. Personality traits in 2017

D. Personality traits in 2018

This section represents the main five personality traits exhibit in different undergraduate students belonging to various universities that use Facebook social media in year 2018.

As per Fig. 10, the openness trend was highly observed in Comsats students in 2018 and a lowest in the UCP University students. Similarly, consciousness trend is maximum in UMT university students and a minimum in UCP university students. Moreover, extroversion trend was more in Comsats university students and lower in UCP university students. The agreeableness trend is highly observed in BU university students in 2018 and minimum in UCP university students. Neuroticism trend is maximum shown by BU university students and minimum in UMT university students.
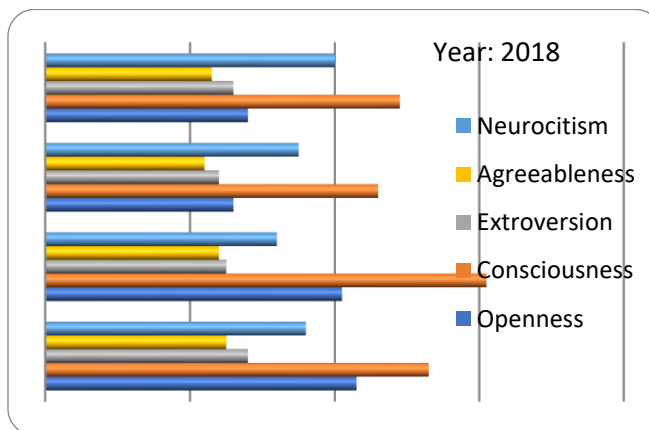

Figure 10. Personality traits in 2018

E. Personality traits result in 2019

This section describes the main five personality traits present in university students participating on social media Facebook in 2019. Fig.11 depicts openness for each university in 2019 representing the maximum value in Comsats students and minimum in UCP University students. Fig. 11 represents the maximum score of UMT university students and minimum rate is reported this year for UCP university students. Also it analyzed that extroversion trait is maximum present in Comsats university students and less in UCP university students. Agreeableness trend is maximum observed in BU and Comsats university students and minimum in UMT university students. Additionally, graph is showing more score of Neurocitism by Comsats university students and less by UMT university students.
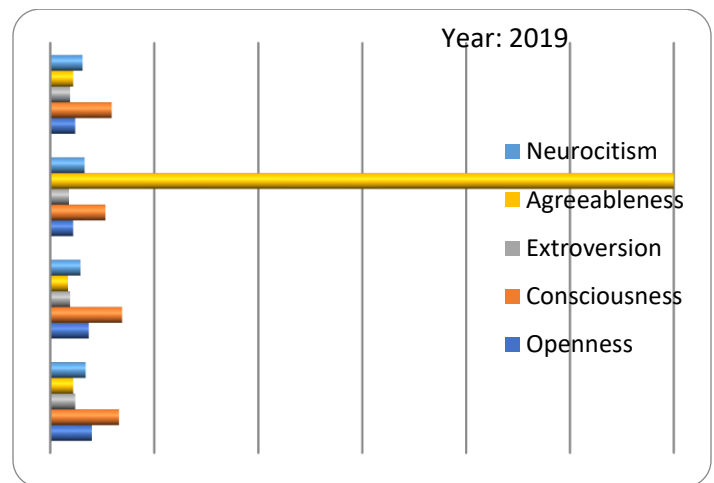

Figure 11. Personality traits in 2019

Analytic Approach to Study Personality Traits Trends year-wise

This section discusses the year-wise trends of each main five personality traits separately in each contributing university.

As seen in Fig. 12, Openness is highly observed in year 2016 and minimum value in the recent year of 2019. 2017 has also shown high value with 0.53 which is near to the year 2016 too. 2015 and 2018 have shown average results with 0.47 and 0.43 respectively.

It can be clearly seen that year 2016 has shown high results of Openness in the students whereas year 2019 is taking the lowest place with value of 0.37. From 2015 to 2016, value has shown an increase in trend from 0.44 to 0.51 but after 2016, decline can be clearly seen that took value of 0.49, 0.41 and finally 0.37 for the years 2017, 2018 and 2019 respectively. 2016 is standing on top with highest value of the personality trait and 2019 is last position with lowest rank. From 2015 to 2016, value has shown significant increase from 0.39 to 0.46 which afterwards declined continuously till year 2019 which has the lowest value of 0.22. While examining the results through figure, it was observed that the trend of openness was slightly higher in 2016 as compared to reported in 2015, then

decrease in 2017,2018, and 2019, indicating a significant decrease in the trend towards openness.
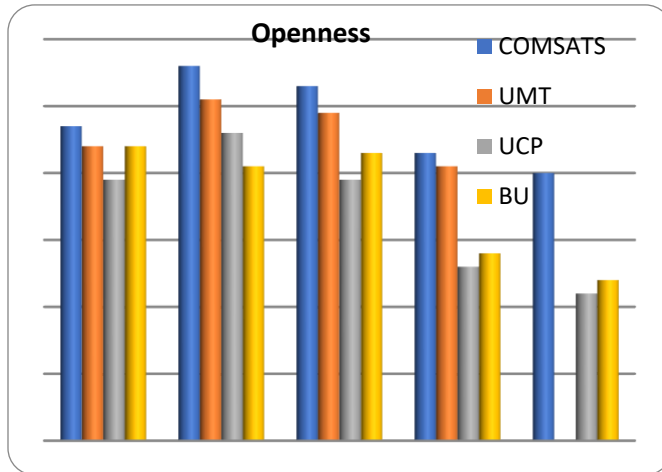

Figure 12. University wise trend of Openness

Consciousness Trend year-wise Between Different Universities

This section covers study on second personality trait which is "Consciousness" among university students' year wise.

Consciousness trend is highly existing in year 2019 with value of 0.66 and minimal in year 2016 with value of 0.32. From year 2016 to year 2019, clear increase in trend is visible with values of 0.32, 0.41, 0.53 and 0.66 for years 2016, 2017, 2018 and 2019 respectively. Highest value is seen in 2019 and lowest is observed in starting year of research that is 2015. it is highest recorded in recent year of 2019 whereas lowest value is stated in year 2015. Also, from year 2015 to year 2019, gradual increase is visible in Consciousness trait of students of UCP.

Fig. 13 expresses the descriptive look on trend followed by Consciousness trait in students of BU.
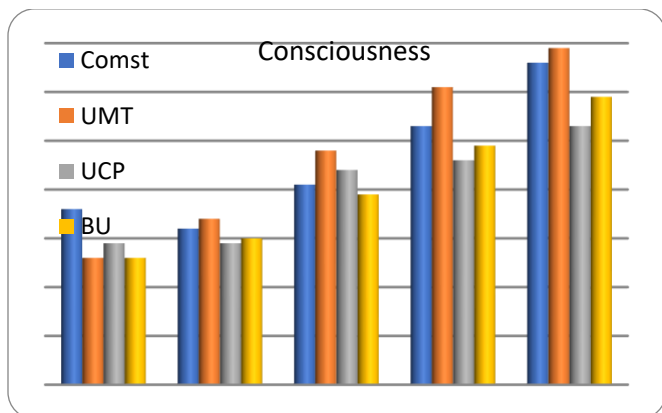

Figure 13. University wise trend of Consciousness

Above figure also demonstrates the identical results as of previous university. Here we have highest recorded value for year 2019 and lowest for 2015.From 2015 to 2019, clear continuous increase is also observed.

To analyze the above results a small variation in the Consciousness trend was noticed in the different participating. A small decrease is observed in the trend of Comsats and UCP. The following three years 2017, 2018, and 2019 observed a steady increase in the trend of consciousness that was the highest in 2019.

Extroversion Trend year-wise among Different Universities

This section covers study on Extroversion personality trait of undergraduate students of various universities of Lahore.

Extroversion is highly observed in year 2016 and lowest in year 2019. Moreover, from year 2016 to year 2019, gradual decline is also observed in the trend of Extroversion personality trait. Moreover, highest value is recorded in year 2015 and lowest in 2019. From 2017 to year 2019, significant decrease in the value is recorded too.

Also, identical highest values for year 2015 and 2016 and lowest value for year 2019. Mix results are obtained for remaining years.
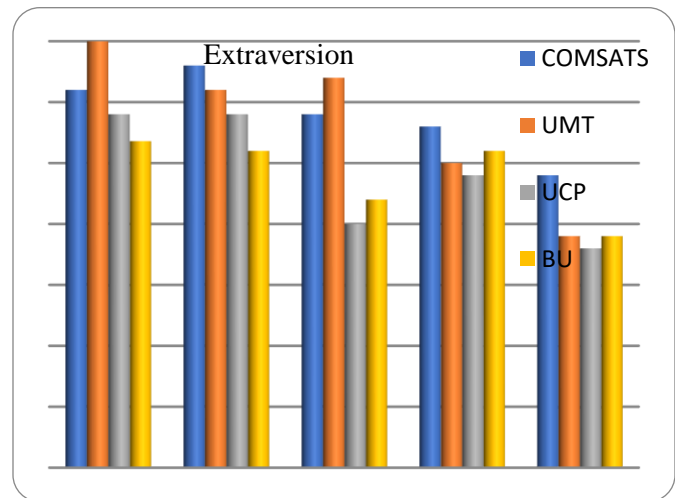

Figure 14. University wise trend of Extraversion

As per above Fig. 14, highest value is recorded for year 2015 and lowest in year 2019. The above results show a small difference in the Extraversion trend was found in different universities that participated. There is a minor change in extraversion trait for the first two years for different universities and then a sudden decrease was noted in the last two years among different universities.

Agreeableness Trend year-wise Between Different Universities

This section covers study of Agreeableness personality trait descriptively in various university students' year wise.

Results depict that highest trend is visible in year 2015 and lowest is recorded in year 2019. Figure notifies highest observed trend for the year 2016 and lowest is recorded for year 2019.Here too, highest trend is observed in year 2016 and lowest in year 2019.
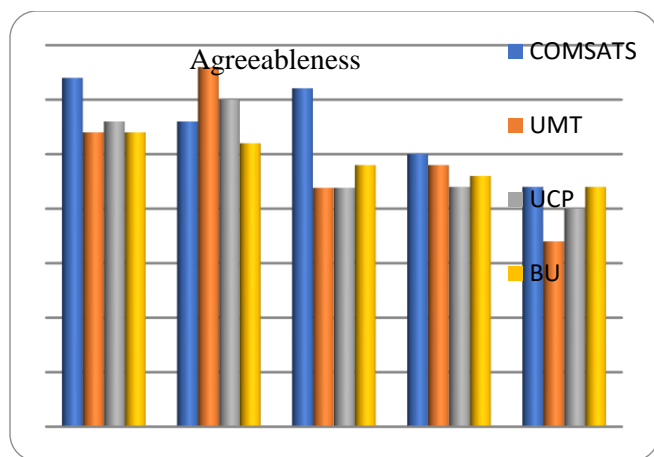
31

Figure 15. University wise trend of Agreeableness

Fig.15 has shown the highest score value for the year 2015 and with gradual decrease from year 2015 to 2019, lowest value is gathered in year 2019.

While examining the results, it was observed that the trend of Agreeableness has been found to decrease continuously over the five years, i.e. from 2015 to 2019. It describes the increases in consciousness, the declines in agreeableness.

Neuroticism Trend year-wise among Different Universities

This section covers descriptive study of Neuroticism personality trait among various students of universities of Lahore from year 2015 to year 2019.

As per Fig. 16, Neuroticism is highly recorded in year 2017 and lowest in previous year that is 2016. Remaining years have shown mix trends in the personality trait.

Figure has shown highest value of Neuroticism in year 2015 and lowest in year 2016. From year 2017 to year 2019, continuous decline in trend is also observed.

Moreover, highest trend is noticed in year 2017 and lowest in year 2016. Year 2018 and 2019 have shown quite identical trends in Neuroticism of UCP students.
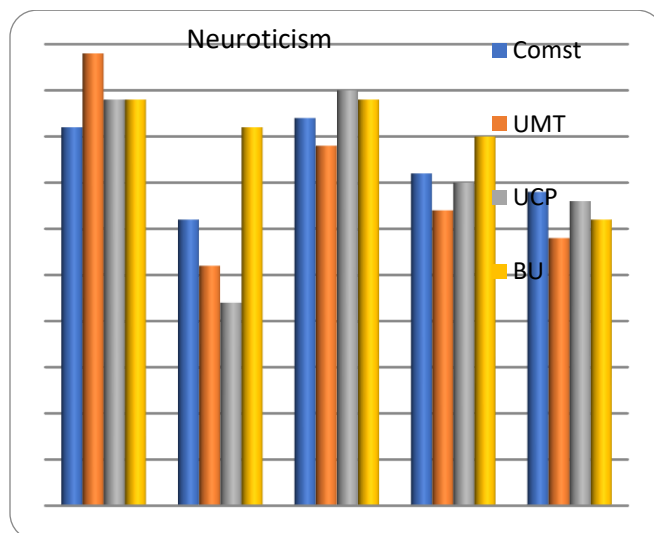

Figure 16. University wise trend of Neuroticism

As per above Fig. 16, year 2015 and year 2017 shares top rank with identical values in trend of Neuroticism whereas lowest value is observed in year 2019.

To analyze the above results a small variation in the Neuroticism trend was noticed in the different participating. An s decrease is observed in the trend of UMT and UCP in 2016. The following three years 2017, 2018, and 2019 observed a decline in the trend of Neuroticism that was the highest in 2019.

The openness trend was highest among Comsats university students in 2015 and a lower rate was reported this year between the UCP students. Consciousness trend was highest among the BU students in 2015 and a lower rate was reported between the UMT students. The extroversion trend was highest between the UMT university students in 2015 and a lower rate was reported between the BU students. The agreeableness trend was highest between the Comsats university students in 2015 and a lower rate of Agreeableness was reported between the BU students. Neuroticism trend was highest among the UMT university students in 2015 and a lower rate was reported among the BU students.

The openness trend was highest in students of Comsats University in 2016 and a lower rate was reported in UCP students. The consciousness trend was highly observed in UMT university students and a lowest in UCP students. Extroversion trend was most observed among Comsats university students in 2016 and minimum in the Bahria university students. The agreeableness trend was maximum in Comsats university students in 2016 and a lower Agreeableness was seen in the UCP university students. Neuroticism trend was highest in Comsats university students in 2016 and a lowest Neuroticism was marked in UMT university students.

The openness trend was highest in Comsats students in 2017 and a lower rate of openness was reported in UCP students. The consciousness trend was more in UMT university students and a less in Bahria university students. The extroversion trend was observed more in UMT university students in 2017 and a less in UCP university students. The agreeableness trend was high in Comsats university students in 2017 and a low in between UCP and UMT university students. Neuroticism trend was highly noticed in UCP university students and lower in UMT university students.

The openness trend was higher in Comsats students in 2018 and a lower in UCP University students. The consciousness was more noticed in UMT university students and less in UCP university students. The extroversion trend was highly reported in Comsats university students in 2018 and less observed in UCP university students. The agreeableness was maximum narrated in BU university students and minimal in UCP university students. Lastly, Neuroticism trend was highly observed in BU university students in 2018 and a lower rate of Neuroticism was seen in UMT university students.

The openness trend is highly observed in Comsats students in 2019 and minimal in UCP University students. Moreover, consciousness trend is more reported among UMT university students and lower in UCP university students. The extroversion trend showed high results in Comsats university

students and reported less presence in UCP university students. The agreeableness trend was more in BU and Comsats university students and less in UMT university students. Neuroticism trend was highest between the Comsats university students in 2019 and UMT students showed the minimal presence of it.

VI.   CONCLUSION

In this research, we analyzed the personality of undergraduate students from different universities to find out what kind of online behavior through OSNs Facebook during their time spent in university during their degree program. We collected the data from their 5-year Facebook profiles (4 years after graduation, and one year before). Also, our significant contributions to this research are to examine symmetrically the personality traits of the undergraduate students through social media Facebook. The major contribution in this research is explored principles of personality traits over the years. The big five traits model which is a model to predict human behavior is used for the research. The suggested framework is structured to evaluate the five major personality traits: openness, agreeableness, extroversion, conscientiousness, and neuroticism.

We can describe the correlation between personality and the profiles of Facebook like the size and flow of their friend networks, number of events visited by them, number of groups attended, numbers of photos uploaded, and number of times students have been tagged in status and photos. Based on these features, we can show the valid relationship between various characteristics of Facebook and a personality trait. This study is to classify the five major personality traits (openness, extroversion, conscientiousness, agreeability, and neuroticism) in persons using OSNs Facebook. As the users spend their time in the university, the personality's level of openness trait falls and the level of consciousness goes up as people spent more time in universities. After enrolling in the university, the level of extroversion declines overall, and the score of agreeableness goes down.

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