Social and cultural computing for social and mental well-being

Tapan Kumar Behera and Dr. Debabrata Samanta

[1]Technical Architect, Forrester Research, MA, USA
[2]Associate Professor, RIT Kosovo (A.U.K), Europe
Corresponding author: Tapan Kumar Behera, e email: tkbehera.usa@gmail.com

March, 2023

Abstract:

In today's fast-paced, technology-driven world, physical presence is no longer necessary, and since the covid-19 pandemic, most operations have been virtual, and with many people working from home, leading to social isolation, and there has been a steady decline in social interaction over the last few decades, which can adversely affect mental and physical health. The loss of a family member, the loss of a job, divorce, or financial hardship can all result in social isolation, discrimination, and a lack of social support. Due to these factors, many people suffer from depression, anxiety, and a variety of other diseases. To overcome this problem, we must be happier in our lives, engage in more social interactions, and be more culturally oriented. Encourage the patient to participate in the surrounding activities, events, functions and share with him the positive and happiest content that can be found on social media so that he can engage in those activities as well. In this chapter, we will discuss how robotic process automation and machine learning technology will improve the efficiency of this process. Robots will analyze social media videos, texts, and messages for sentiment analysis, user recommendations, and social network analysis, and share filtered happy context messages with emotionally depressed individuals. Virtual reality, online communities, and social media can facilitate mental health support, cultural engagement, and creative expression. As their mental health and happiness improve, they can make a greater contribution to society.

Index terms: social media, mental health, machine learning, Sentiment analysis, NLP, Recommendation system, Psychological well-being, Social network analysis

Introduction:

Social and cultural computing can play a significant role in promoting social and mental well-being. In social computing, technology is used to facilitate communication, collaboration, and information sharing among people. Technology can also be used to promote cultural heritage and diversity through cultural computing.

In order to promote mental and social well-being, social and cultural computing can be used in the following ways:

1. Social Support:

For individuals who may feel alone or isolated, social computing platforms such as social media, online support groups, and forums can provide a sense of community and social support. It can provide a safe space for individuals with mental health challenges to discuss and receive support, which can help reduce feelings of loneliness.

People within one's social network provide help, assistance, and comfort to one another. Social support can take many forms, including instrumental support, informational support, emotional support, and appraisal support.

A person who is experiencing stress, trauma, or difficult life circumstances needs someone to provide empathy, care, and encouragement. Providing reassurance, empathy, and compassion can all contribute to this.

In instrumental support, tangible assistance is provided, such as financial or material resources, transportation, or help with daily activities.

The purpose of informational support is to provide advice, guidance, or information about a particular topic or issue. Shared knowledge, expertise, or resources can help someone solve a problem or make informed decisions.

Feedback, guidance, or evaluation of someone's thoughts, feelings, or actions is part of appraisal support. An individual can gain a fresh perspective on a situation, identify strengths and weaknesses, and make positive changes as a result.

Individuals' mental and social well-being can be improved through social support, which can help them cope with stress, reduce the negative impact of traumatic events, and improve resilience. As well as providing a sense of belonging, social support can also help improve mental health. People with strong social support networks tend to have better mental health outcomes, including fewer anxiety and depression symptoms and better overall physical health.

2. Promoting creativity and self-expression

Individuals can express their creativity and connect with others who share their interests through cultural computing. Those who feel inhibited or unable to express themselves in traditional social settings may benefit from this.

Promoting creativity and self-expression can have many positive impacts on social and mental well-being. Here are some ways in which creativity and self-expression can be promoted:

i. Provide opportunities for creative expression: Allowing individuals to express themselves creatively can promote self-esteem and a sense of accomplishment. Classes such as art classes, music lessons, creative writing workshops, or dance classes can be included in this category.

ii. Developing the imagination and promoting personal growth can be achieved by encouraging individuals to try new things and experiment with different forms of artistic expression. Experimenting with different mediums, styles, or techniques can be part of this process.

iii. Develop a supportive environment: Creating a supportive, non-judgmental environment allows individuals to express themselves freely and take creative risks. It can involve providing constructive feedback, fostering collaboration, and celebrating individual accomplishments.

iv. Creativity can promote a sense of playfulness and joy in daily life. Journaling, sketching, or taking photographs can all be included.

v. Using technology to promote creativity: Digital art, music production software, and online creative communities can be used to facilitate and enhance creative expression.

As a result of promoting creativity and self-expression, individuals can develop a sense of identity and purpose, improve problem-solving skills, reduce stress, and improve mental health.

3. Education and Awareness

Mental health issues, cultural diversity, and social justice can be raised through social and cultural computing. People are more likely to feel compassionate and empathetic towards others when they are aware of and understand these issues, which leads to an increase in social well-being.

Promoting social and mental well-being requires education and awareness. Well-being can be supported by education and awareness in the following ways:

i. Education and awareness campaigns can provide information about mental health issues, such as the signs and symptoms of different conditions and how to access treatment and support. Mental health can be made more visible and stigmatized if this is done.

ii. The promotion of understanding and empathy for mental health issues can also be achieved through education and awareness. Providing information about the social and cultural factors that can contribute to mental health issues can help raise awareness about mental health's impact on individuals and communities.

iii. In order to encourage individuals to seek help when they are struggling with mental health issues, education and awareness campaigns can be used. Mental health resources, such as hotlines, counseling services, and support groups, can be promoted in this way.

iv. Educational and awareness campaigns can also help address social and cultural factors that contribute to mental health issues, such as discrimination, poverty, and social isolation. By raising awareness about these factors and promoting policies and programs that address them, mental health can be improved.

v. Resilience can be fostered and positive coping strategies can be promoted through education and awareness. Self-care strategies, stress management techniques, and healthy lifestyle behaviors can be discussed.

As a whole, education and awareness can reduce stigma, increase understanding and empathy, encourage help-seeking behavior, address social and cultural factors contributing to mental health problems, and promote resilience and positive coping styles.

4. Digital Interventions:

With social and cultural computing, digital interventions can be developed from anywhere and at any time, such as online therapy or mindfulness apps. Individuals can benefit from these interventions by managing mental health challenges and improving their overall health.

Technology is used in digital interventions to support, treat, or educate people regarding mental health and well-being through mobile apps, online platforms, or virtual reality. Social and mental well-being can be supported by digital interventions in the following ways:

i. Individuals with limited geographic or financial access to traditional mental health services can benefit from digital interventions by increasing access to mental health resources.

ii. The convenience of accessing digital interventions from home at any time is another benefit. Traditional therapy sessions may not be feasible for individuals with busy schedules or limited time.

iii. Digital interventions can be tailored to meet the needs and preferences of individuals. Personalized feedback, recommendations, or treatment plans can be given based on an individual's responses or behaviors.

iv. Gamification refers to incorporating game-like features into digital interventions, such as rewards, challenges, and social support. Making mental health support more fun and enjoyable can increase engagement and motivation.

v. Tracking and analyzing data: Digital interventions can monitor an individual's behavior, symptoms, and progress over time. In this way, patterns can be identified, progress can be tracked, and personalized recommendations or interventions can be provided.

In order to provide many benefits for mental and social well-being, digital interventions must be evidence-based, user-friendly, and ethically designed. Furthermore, digital interventions should not be viewed as a replacement for traditional mental health services, but as a complementary tool to support and enhance them.

Social and cultural computing using machine learning Techniques.

Social and cultural computing using machine learning involves analyzing and predicting social and cultural phenomena using algorithms and statistical models. Machine learning can be used in social and cultural computing in the following ways:

1. Sentiment analysis:

Social media posts, online reviews, and other forms of digital communication can be analyzed using machine learning to identify sentiment patterns. Social and cultural attitudes and experiences can be better understood by using this information, as well as interventions to improve well-being.

In natural language processing (NLP), sentiment analysis is a technique used to identify and extract subjective information from texts, such as opinions, emotions, and attitudes, from the text. Sentiment analysis determines whether a piece of text is positive, negative, or neutral.

An analysis of sentiment can be useful in a variety of applications, such as marketing, customer service, and social media. Sentiment analysis can be used by companies to determine the overall sentiment towards their products and services through social media conversations. Customer service teams can also use sentiment analysis to identify and respond to negative customer feedback quickly.

Social media posts, online reviews, and other forms of digital communication can be analyzed using sentiment analysis in the context of social and cultural computing. Social and cultural attitudes and experiences can be better understood through this information and interventions can be developed to improve well-being.

As an example, sentiment analysis can be used to monitor online discussions about mental health and identify patterns of negative sentiment or stigma. Mental health awareness and stigma reduction campaigns can be developed using this information.

Research and practitioners can use sentiment analysis to gain insights into attitudes and experiences related to social and cultural computing, as well as to develop interventions to improve mental health and social support.

2. Recommendation systems:

The use of machine learning can be used to create personalized recommendations for social and cultural experiences, such as cultural events, activities, or communities, with the help of machine learning. Machine learning algorithms identify social connections and cultural engagement opportunities based on user preferences and behaviors.

In social and cultural computing, recommendation systems can be used to provide personalized recommendations to users based on their interests, behavior, and preferences. In social and cultural computing, the following machine learning algorithms are commonly used:

i. Collaborative Filtering: Users are recommended items based on their similar preferences by this algorithm. Social connections or cultural events can be recommended based on the behavior of similar users.

ii. Content-based filtering: Based on the characteristics of the items and the user's past behavior, the algorithm recommends items to the user. Cultural content, such as books, movies, or music, can be recommended based on a user's past consumption behavior.

iii. Hybrid Filtering: To generate recommendations, this algorithm combines collaborative and content-based filtering. Both user preferences and item characteristics can be taken into account to provide more accurate and diverse recommendations.

iv. Matrix Factorization: To generate recommendations, this algorithm uses a low-dimensional representation of the user-item matrix. Using user-item interactions and preferences, it can recommend social connections or cultural events.

v. Deep Learning: The algorithm generates recommendations using neural networks. To provide personalized and diverse recommendations, it can capture complex patterns in user behavior and item characteristics.

vi. Knowledge-Based Systems: Domain knowledge is used to generate recommendations in this algorithm. Users can be recommended cultural events or activities based on their interests and preferences.

In social and cultural computing, machine learning algorithms can be used to recommend systems. Data and the specific task determine the algorithm to be used. To choose the best algorithm for the task, each algorithm must be evaluated on a specific dataset.

3. Social network analysis:

To identify patterns of social interactions and relationships, machine learning can be used to analyze social network data. A social connection intervention can be developed based on this information to reduce social isolation and promote social connection.

To enhance the results of social network analysis (SNA), machine learning (ML) techniques can be applied. Social network analysis is the process of identifying key actors, groups, and relationships within social networks, such as those found on social media platforms.

Some common ML techniques used in Social network analysis include:

i. Graph-based algorithms: These algorithms analyze social networks in order to identify their nodes (users) and edges (connections between users). Algorithms based on graphs include community detection algorithms, centrality algorithms, and clustering algorithms.

ii. Deep learning: Social networks can be analyzed using deep learning techniques to analyze text, images, and other types of data. In social media posts, deep learning models can be trained to detect sentiment or fake news or hate speech, for example.

iii. Natural language processing (NLP): Social media posts, comments, and other user-generated content can be analyzed using NLP techniques. Social media content can be analyzed using natural language processing to identify topics, sentiment, and other key features.

4. Predictive modeling:

Social and cultural phenomena, such as social media trends or cultural engagement, can be predicted using machine learning.

Using predictive modeling in social and cultural computing can be used to predict various outcomes, such as the likelihood of a user engaging with a particular type of content or the probability of an event occurring on a social media platform.

In social and cultural computing, the following types of predictive modeling are commonly used:

i. Regression analysis: In this technique, relationships between variables are identified and predictions are made based on those relationships. Based on the content and time of day of a particular social media post, regression analysis can predict how many likes or shares it might receive.

ii. Decision trees: Based on a series of binary decisions, decision trees can be used to make predictions. Users' age, gender, and location can be used to predict whether they will engage with a particular type of content using a decision tree.

iii. Random forests: Multiple decision trees are used to make predictions in random forests, a type of ensemble learning algorithm. Due to their high accuracy and ability to handle large data sets, random forests are often used in social and cultural computing.

iv. Neural networks: Deep learning algorithms such as neural networks can be used to make predictions based on complex patterns in data. Social and cultural computing can use neural networks to predict a variety of outcomes, such as the likelihood of a user clicking on an ad or engaging with a specific piece of content.

As machine learning offers promising opportunities for social and cultural computing, it is important to ensure that these algorithms are ethically designed and used, taking bias, privacy, and transparency into consideration. To ensure that these technologies meet the needs and preferences of the people and communities, it is important to involve them in their development and evaluation.

Taxonomy of Mental Healthcare

As show in the Figure -1, the taxonomy of Mental Healthcare. This section describes different aspects of mental healthcare. ECG signals, electronic health records, demographics, and other medical reports are available for neuroscience-based studies in the biomedical domain. Human behavior within society is closely associated with the social aspects of mental health studies. The psychological aspect focuses mainly on theorizing the thoughts of people regarding mental health since it is a psychological aspect. To what extent and in what manner can the data be used is the ethical aspect of the data. Preventive and control measures for mental health issues may be examined separately or in conjunction with any of the corresponding aspects (Garg, M, 2023)

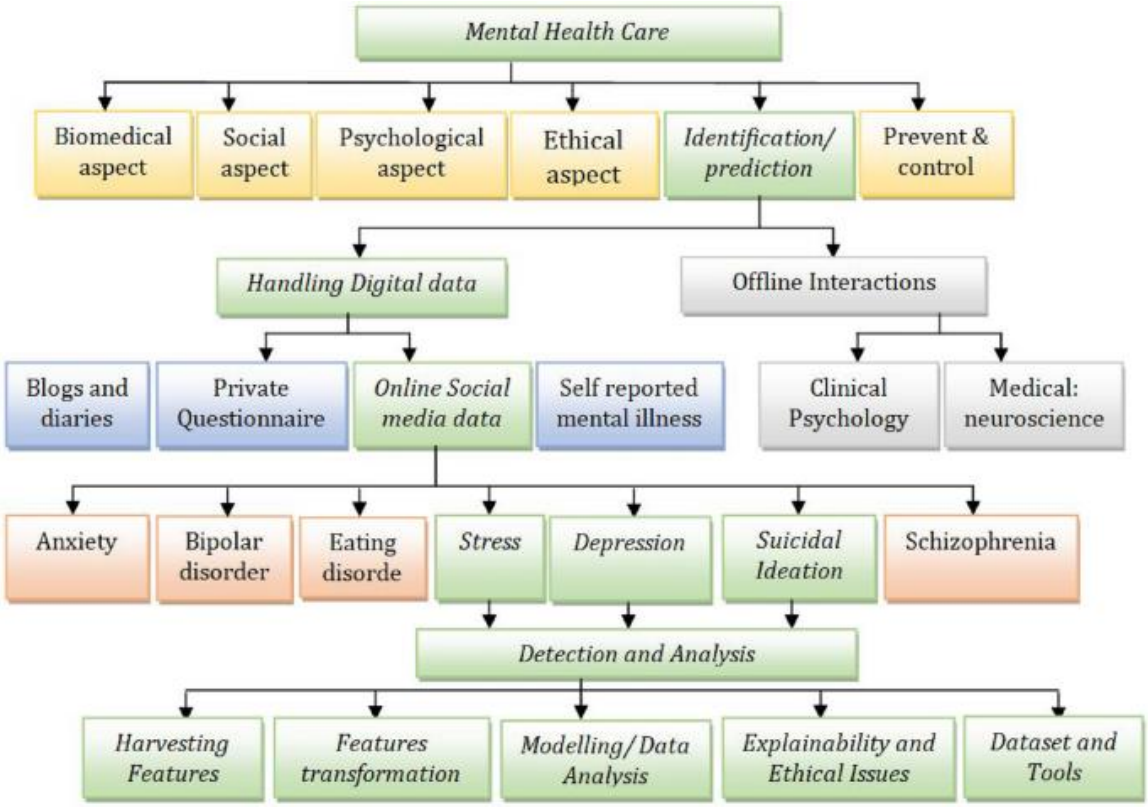

Figure -1: Taxonomy on mental healthcare

A mental health taxonomy categorizes mental health conditions based on their symptoms, causes, and treatment options. The following are some examples of mental healthcare taxonomies:

i. A widely used taxonomy for mental health conditions, the Diagnostic and Statistical Manual of Mental Disorders (DSM) was developed by the American Psychiatric Association. Mental health professionals use it to diagnose and treat mental health conditions based on symptoms and diagnostic criteria.

ii. International Classification of Diseases (ICD): World Health Organization (WHO) developed the ICD to categorize diseases and health conditions, including mental health conditions. Globally, it is used to classify and track health conditions and to inform public health policies and programs.

iii. Biopsychosocial Model: Psychological, biological, and social factors all contribute to mental health conditions under the biopsychosocial model. To develop effective treatment strategies, it is important to understand how these factors interact.

iv. Problem-Based Taxonomy: Problem-based taxonomy categorizes mental health conditions based on the problems that individuals are experiencing, such as anxiety, depression, or trauma. The purpose of this taxonomy is to identify the specific problems that individuals are experiencing and develop targeted interventions to address them.

v. Dimensional Taxonomy: As opposed to specific diagnostic criteria, the dimensional taxonomy categorizes mental health conditions based on the severity and intensity of symptoms. To guide treatment planning, this taxonomy is used to identify an individual's level of impairment.

Features from Social Media Data

Data from social media can reveal a great deal about people and their behaviors, interests, opinions, and attitudes. The following features can be extracted from social media data:

i. Textual Data: In social media platforms, posts, comments, and messages are mostly text-based, and there is a large amount of data available. A variety of features can be extracted from these data, such as sentiment, topic, and language.

ii. User Demographics: User demographic information, such as age, gender, location, and occupation, is collected by social media platforms. Using these data, marketing campaigns can be tailored based on the user base.

iii. User Behavior: A user's behavior can be analyzed by using social media data, such as how often and when they post, share, like, and comment on posts. Users' preferences and engagement can be analyzed using this information.

iv. Network Analysis: The social network and connectivity between users can be analyzed using social media data. Users, communities, and trends can be identified based on features such as followers, likes, and retweets.

v. Image and Video Data: Social media platforms are increasingly visual, and images and videos are abundant. These data can be analyzed using features such as image recognition, object detection, and sentiment analysis.

vi. Location Data: In many social media platforms, users can share their location, and this information can be used to extract location-based features such as check-ins, travel patterns, and popular locations that users are using on the platform.

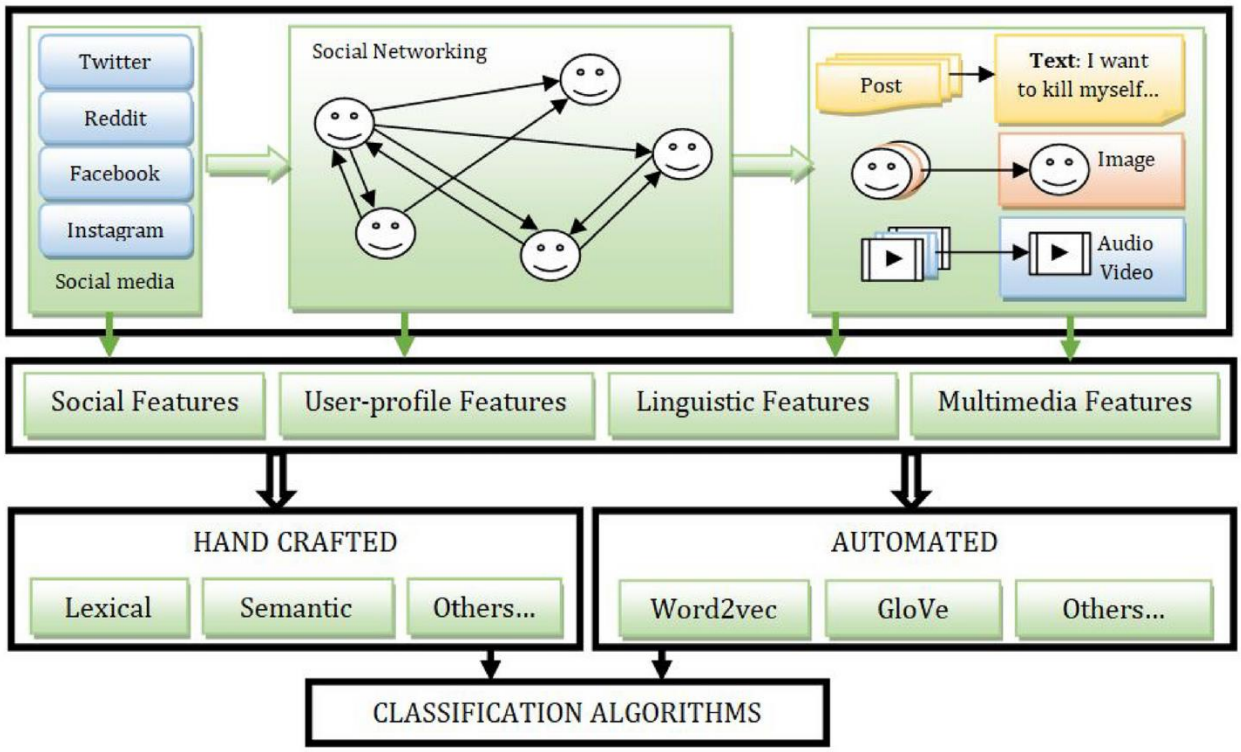

Figure -2: Shows the Social Media Data Feature Extraction

The information provided by social media can be used for a variety of purposes, including marketing, research, and social network analysis. As shown in the Figure -2 the social media data of Twitter, Reddit, Facebook, Instagram. It shows the cross-sectional study architecture to infer mental state from social media data. Handcrafted features, statistical information, and automated features are some of the features that are used in learning-based models. According to Figure-3, we categorize and discuss four classes of features: user profiles, linguistic features, social features, and multimedia features.

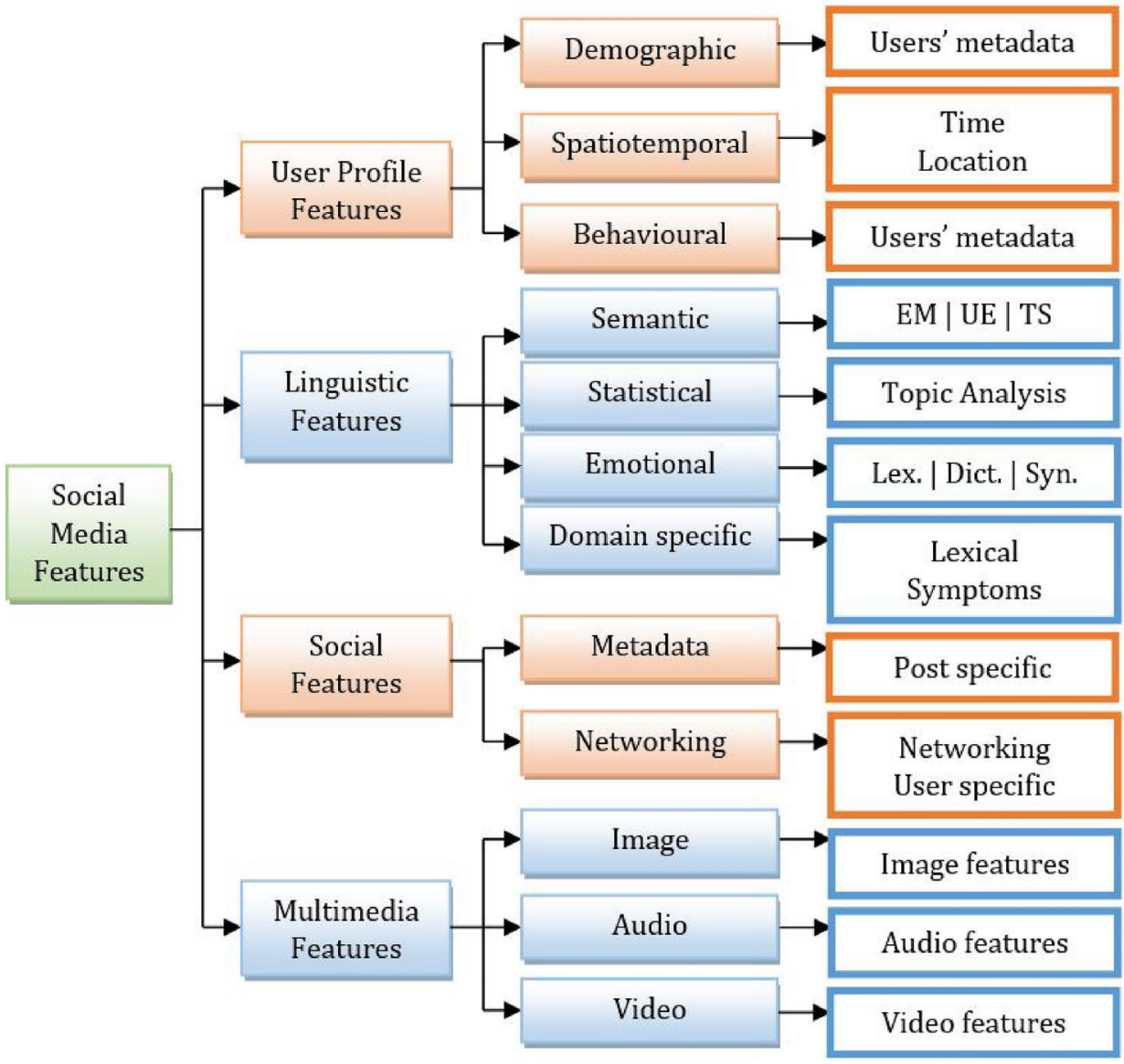

Figure -3: Classification of social media features for quantifying suicidal tendencies

User Profile Feature:

A user profile usually includes a variety of features that allow individuals to present themselves online. User profiles typically include the following features:

An individual's profile picture represents him or her visually. A username is a unique identifier used by online users to identify themselves. Information about a user's interests, hobbies, and personal characteristics. A user's profile may include contact information, including an email address or social media handle, depending on the platform. To connect with others nearby, users can share their geographic location.

Linguistic Features

The linguistic features of language include grammar, vocabulary, syntax, and discourse, which convey meaning. Here are some examples of linguistic features:

Phonology and phonetics are the study of speech sounds and their patterns. The study of the structure and formation of words. The study of how sentences are structured in a language is known as syntax. A study of meaning in language, including word meaning, sentence meaning, and discourse meaning.

Social Features

There are various social features that can be found on a social network or on an online platform that encourage social interaction between users and facilitate communication among them. In terms of social features, some of them are as follows:

i. The friend/following system is a system that allows users to connect with and follow other users on a platform who have similar interests.
ii. It's also called a newsfeed or timeline, as it displays a stream of posts and updates published by users on the platform's homepage.
iii. A feature that allows users to send private messages to one another is known as messaging.
iv. Groups/communities: A feature that allows users to create or join groups or communities based on their common interests on the site.
v. Commenting is a feature that allows users to leave comments on posts or content that has been shared by other users.
vi. A feature that allows users to share content, such as articles, photos, and videos, with their friends or followers is called sharing.

Multimedia Features

A multimedia feature can be defined as a component of a digital platform that integrates different types of media in order to enhance the user experience of the platform as a whole. The following are some of the most common multimedia features:

i. Photographs, illustrations, and graphics are all used to enhance the visual appeal of a platform by providing photos, illustrations, and graphics.
ii. A variety of video formats can be used, including pre-recorded videos, live streams, and video calls with dynamic and interactive content.
iii. Including music, podcasts, and sound effects that you can play on the platform, such as music, podcasts, and sound effects.

Sentimental Analysis Using Spark Machine Learning and Scala, as follows:

Steps:

1. To work with Spark, we must first create a SparkSession object.

```
import org.apache.spark.sql.SparkSession

val spark = SparkSession.builder()
              .appName("SentimentAnalysis")
              .master("local[*]").getOrCreate()
```

2. The next step is to load the dataset of text data we will analyze for sentiment. Any type of text data can be used, such as customer reviews, social media posts, or other texts. A dataset of customer reviews could be loaded as follows:

```
val custReviews = spark.read.option("header","true")
                            .csv("customer_reviews_data.csv")
```

3. As a next step, we need to preprocess the text data in order to prepare it for sentiment analysis. The process usually involves removing any irrelevant information, such as punctuation and stop words, and converting the text data into a machine-readable format. The text data could be preprocessed as follows:

```
import org.apache.spark.ml.feature.StopWordsRemover
import org.apache.spark.ml.feature.Tokenizer


val tokenizer = new Tokenizer().setInputCol("text")
                               .setOutputCol("words")

val remover = new StopWordsRemover().setInputCol("words")
                                    .setOutputCol("filtered")

val words = tokenizer.transform(custReviews)

val filteredWords = remover.transform(words)
```

4. The preprocessed text data can then be used to train a machine learning model for sentiment analysis. As an example, we could train a Logistic Regression model as follows:

```
import org.apache.spark.ml.classification.LogisticRegression
import org.apache.spark.ml.feature.{HashingTF, IDF}

val hashingTF = new HashingTF().setInputCol("filtered")
                               .setOutputCol("rawFeatures")

val idf = new IDF().setInputCol("rawFeatures")
                   .setOutputCol("features")


val lr = new LogisticRegression().setLabelCol("label")
                                 .setFeaturesCol("features")


val pipeline = new Pipeline().setStages(
                       Array(tokenizer, remover, hashingTF, idf, lr))


val model = pipeline.fit(trainingData)
```

5. Finally, we can use the trained model to predict sentiment from new text data. As an example, we could predict the sentiment of a new customer review as follows:

```
val newReview = Seq("This product is great!").toDF("text")

val prediction = model.transform(newReview)
```

In the **prediction** DataFrame, we will present a predicted label for the new review, as well as a probability score indicating the degree of confidence the model has in its prediction. In analyzing the predicted labels for a large dataset of text data, we can gain insights into the sentiment of the text data and use these insights to improve our products.

Negative Impact

The same time, social and cultural computing can also negatively affect mental health, particularly when it comes to cyberbullying, online harassment, and the pressure to curate a perfect image on social media. Therefore, social and cultural computing should be approached with thought and intentionality, recognizing both its potential benefits and risks, and taking steps to minimize them.

Conclusion:

According to our study, social and cultural computing can play a significant role in promoting well-being on both a social and mental level. Technology can play an important role in facilitating communication, collaboration, and information sharing between people as part of social computing. Social and cultural computing plays a significant role in promoting mental and emotional well-being. The promotion of mental and social well-being can take several forms, including social support, promotion of creativity and self-expression, education and awareness, and the use of digital interventions, among others. Using robotic process automation and Machine Learning technology, we will be able to improve the efficiency of this process. By using robotics, we will be able to perform sentiment analysis, user recommendations, and social network analysis on the Social Media videos, texts, and messages, and share the filtered happy context messages with the emotionally depressed individuals. By improving their mental health and happiness in life, they will be able to make a greater contribution to society as a whole.

Reference:

Garg, M. Mental Health Analysis in Social Media Posts: A Survey. Arch Computat Methods Eng (2023). https://doi.org/10.1007/s11831-022-09863-z

Herdiansyah, Haris, et al. "Their post tell the truth: Detecting social media users mental health issues with sentiment analysis." Procedia Computer Science 216 (2023): 691-697.

Benrouba, Ferdaous, and Rachid Boudour. "Emotional sentiment analysis of social media content for mental health safety." Social Network Analysis and Mining 13.1 (2023): 17.

Rashida, Udaipurwala, and K. Suresh Kumar. "Social Media Mining to Detect Mental Health Disorders Using Machine Learning." Sentiment Analysis and Deep Learning: Proceedings of ICSADL 2022. Singapore: Springer Nature Singapore, 2023. 923-930.

Jabbour, Diana, et al. "Social media medical misinformation: impact on mental health and vaccination decision among university students." Irish Journal of Medical Science (1971-) 192.1 (2023): 291-301.

Keles, Betul, Annmarie Grealish, and Mary Leamy. "The beauty and the beast of social media: an interpretative phenomenological analysis of the impact of adolescents' social media experiences on their mental health during the Covid-19 pandemic." Current Psychology (2023): 1-17.

Lentzen, Max-Philipp, et al. "A retrospective analysis of social media posts pertaining to COVID-19 vaccination side effects." Vaccine 40.1 (2022): 43-51.

Yang, Kailai, Tianlin Zhang, and Sophia Ananiadou. "A mental state Knowledge–aware and Contrastive Network for early stress and depression detection on social media." Information Processing & Management 59.4 (2022): 102961.

Behera, Tapan; Tripathi, Kumud (2022): Root Cause Analysis Bot using Machine Learning Techniques. TechRxiv. Preprint. https://doi.org/10.36227/techrxiv.21588159.v2

Naseem, Usman, et al. "Early identification of depression severity levels on reddit using ordinal classification." Proceedings of the ACM Web Conference 2022. 2022.

Behera, Tapan; Panda, BS (2023): Master Data Management using Machine Learning Techniques: MDM Bot. TechRxiv. Preprint. https://doi.org/10.36227/techrxiv.21818040.v1

Britton, Úna, et al. "Moving well-being well: Using machine learning to explore the relationship between physical literacy and well-being in children." Applied Psychology: Health and Well-Being (2023).

Vidhya, R., et al. "A Predictive Model Emotion Recognition on Deep Learning and Shallow Learning Techniques Using EEG Signal." Principles and Applications of Socio-Cognitive and Affective Computing. IGI Global, 2023. 43-50.

Jadala, Vijaya Chandra, et al. "Implementation of Machine Learning Methods on Data to Analyze Emotional Health." Computer Vision and Machine Intelligence Paradigms for SDGs: Select Proceedings of ICRTAC-CVMIP 2021. Singapore: Springer Nature Singapore, 2023. 319-327.

Vidhya, R., et al. "A Predictive Model Emotion Recognition on Deep Learning and Shallow Learning Techniques Using EEG Signal." Principles and Applications of Socio-Cognitive and Affective Computing. IGI Global, 2023. 43-50.

Tiffin, Paul A., and Lewis W. Paton. "Machine learning and child and adolescent mental health services: challenges and opportunities." Shaping the Future of Child and Adolescent Mental Health (2023): 81-108.

Zhang, Tianlin, et al. "Natural language processing applied to mental illness detection: a narrative review." NPJ digital medicine 5.1 (2022): 46.

Amanat, Amna, et al. "Deep learning for depression detection from textual data." Electronics 11.5 (2022): 676.

Amanat, A., Rizwan, M., Javed, A. R., Abdelhaq, M., Alsaqour, R., Pandya, S., & Uddin, M. (2022). Deep learning for depression detection from textual data. Electronics, 11(5), 676.

Abdullah, Khairul Hafezad, and Davi Sofyan. "Machine Learning in Safety and Health Research: A Scientometric Analysis." International Journal of Information Science and Management (IJISM) 21.1 (2023): 17-37.

Butkevičiūtė, Eglė, Liepa Bikulčienė, and Aušra Žvironienė. "Physiological State Evaluation in Working Environment Using Expert System and Random Forest Machine Learning Algorithm." Healthcare. Vol. 11. No. 2. MDPI, 2023.

Choi, Katherine Elena. "Evaluating the Predictive Performance of Genomic Data-based Machine Learning Models for 4 Different Mental Health Disorders." (2023).

Behera, Tapan, How Blockchain Solves the Supply Chain Problems Using RFID Techniques (November 27, 2022). Available at SSRN: https://ssrn.com/abstract=4287240

Choi, Katherine Elena. "Evaluating the Predictive Performance of Genomic Data-based Machine Learning Models for 4 Different Mental Health Disorders." (2023).