IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

Stress and Depression Detection using Machine Learning

A. M. Magar[1], Vikrant Kharosekar[2], Aakash Patil[3], Suraj Lakade[4], Rajendra Sang[5]
Assistant Professor, Department of Information Technology[1]
Scholar, Department of Information Technology[2,3,4,5]
Sinhgad Academy of Engineering, Savitribai Phule Pune University, Pune, India

Abstract: *One of the most generally recognised and debilitating mental issues that materially affects society is stress and depression. [Citation needed] [Citation needed] The improvement of a system for detecting sadness and stress through the use of social networking could significantly benefit from the implementation of automatic health monitoring systems. The term "sentiment analysis" refers to the practise of identifying feelings or opinions through the application of natural language processing and content mining methodologies. replete with emotion The study and development of systems and devices that can detect, decode, analyse, and simulate human actions is what computing is all about. The techniques of sentiment analysis and deep learning could provide effective algorithms and frameworks for the evaluation and observation of mental issues, particularly depression and stress. In this article, we explain how methods from sentiment analysis and deep learning can be applied to the detection and monitoring of mental health conditions such as depression and stress. In addition, a fundamental plan of an integrated multimodal framework for testing for stress and depression is proposed. This plan includes estimating investigation as well as full of emotion processing procedures. In particular, the study retraces the fundamental difficulties and then carries on to provide a comparison analysis of the structure of such a framework.*

Keywords: Anxiety and Depression; E-Health; Deep Learning, Social Media, and Sentiment Analysis.

I. INTRODUCTION

It may be argued that social media is the most fruitful source of human-generated text input. The attitudes and feelings that internet users have regarding particular subjects are reflected in their opinions, feedback, and critiques of such subjects. The purpose of this work is to propose a knowledge-based system that contains an emotional health monitoring system for the purpose of identifying users who may be suffering from potential psychological diseases, in particular depression and stress. The symptoms of these mental disorders are typically recognised without active participation. The authors believe that this circumstance presents an opportunity to actively diagnose psychological disease at an early stage through the extraction of online social behaviour. Because the psychological aspects that are taken into consideration in the conventional diagnostic criteria questionnaire are not able to be observed in the registers of online social activities, it is difficult to detect the disorder.

One of the most prevalent forms of mental illness that can significantly impair one's ability to function, depression and stress also has a significant influence on society. At this time, the approaches for detecting and diagnosing depression and stress rely on self-reporting and the educated evaluation of the health care practitioner. It is possible that the supply of efficient health monitoring systems and diagnostic aids could be significant and important in improving the job of health professionals and lowering the expenses of providing healthcare. The technologies of sentiment analysis and deep learning could be of assistance in achieving these goals by delivering efficient methods and apparatuses for objective evaluation. These kinds of tools and systems are not intended to take the role of a psychologist or psychiatrist, but they may assist those professionals in making judgments.

Because our method, which is novel and ground-breaking for the field of psychological disorder detection, does not rely on the respondent's own self-disclosure of psychological elements, it does not trust the results of those surveys. Instead, you should propose a machine learning technique for the detection of psychological disorders in social networks. This technique should make use of the features that have been extracted from social network data in order to precisely identify any potential instances of psychological disorders. We do a study of the features of both types of psychiatric diseases, as well as an application of machine learning to huge data sets and an analysis of the features.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

II. STATE OF THE ART SURVEY OF LITERATURE

Renata L. Rosa, Gisele M. Schwartz, Wilson V. Ruggiero, and Dem´ostenes Z. Rodr´ıguez - The information that people submit about their perspectives on a variety of topics is made available through online social networks (OSN). Consequently, software programmes such as monitoring and recommendation systems (RS) are able to gather and evaluate this data. In this study, a Knowledge-Based Recommendation System (KBRS) is presented. One component of this system is an emotional health monitoring system, which is designed to identify users who may be suffering from probable psychological disturbances such as stress or depression.

Guang Yang, Haibo He, Fellow, IEEE, and Qian Chen - Even though there has been a lot of research done on sentiment analysis of microblog posts, it is still difficult to do because posts typically only contain a small amount of contextual information. In the context of microblogging, emoticons are used often, and each one has a distinct emotional connotation. They are vitally crucial emotional cues for the sentimental interpretation of microblog posts. In order to solve this problem, they built an emotional space in the form of a feature representation matrix and then projected emoticons and words into the emotional space depending on the semantic composition of the data.

M. Al-Qurishi, M. S. Hossain, M. Alrubaian, S. M. M. Rahman, and A. Alamri - An integrated social media content analysis platform is proposed by the authors of this paper. This platform makes use of three levels of features, namely user-generated content, social graph connections, and user profile activities, in order to analyse and detect anomalous behaviours in large-scale social networks. These behaviours differ significantly from the norm in large-scale social networks. In the process of identifying highly adaptable harmful users, a variety of different kinds of analysis have been carried out in order to gain a better understanding of the various user behaviours.

Huijie Lin, Jia Jia, Jiezhon Qiu, Yongfeng Zhang, Lexing Xie, Jie Tang, Ling Feng, and Tat-Seng Chua - We leverage a large-scale dataset from real-world social platforms to comprehensively explore the association between users' stress levels and social interactions. In this work, we find that a user's stress condition is closely related to that of his or her friends in social media. First, we define a set of stress-related textual, visual, and social attributes from a variety of perspectives. Next, we propose a novel hybrid model, which is a combination of a factor graph model and a Convolutional Neural Network, to leverage tweet content and information about social interactions for the purpose of stress detection.

Budhaditya Saha, Thin Nguyen, Dinh Phung, Svetha Venkatesh - Individuals, families, and, by extension, society as a whole are all profoundly impacted by the condition known as mental illness. Studies on the textual symptoms of mental health problems can make use of the rich resource provided by social networks since they enable people with mental diseases to communicate with other people who also suffer from the same condition through online communities. It is common for people to have more than one mental illness at a time. For instance, a patient who already suffers from anxiety may also struggle with despair.

Chun-Hao Chang, Elvis Saravia, Yi-Shin Chen - In this paper, we aim to build predictive models that leverage language and behavioural patterns, particularly those that are used in social media, to determine whether or not a user is suffering from two different types of mental disorder. Specifically, we focus on identifying people who use social media. These predictive models have been made possible by the utilisation of a revolutionary data collecting procedure that has been dubbed "Subconscious Crowdsourcing." This method assists in the collection of a patient dataset in a quicker and more trustworthy manner. According to the results of our research, obtaining certain language patterns and social interaction characteristics from trustworthy patient datasets can make a significant contribution to both the ongoing investigation and the identification of mental diseases.

Andrey Bogomolov, Bruno Lepri, Michela Ferron, Fabio Pianesi, Alex (Sandy) Pentland- In this paper, we propose an alternative method that provides evidence that daily stress can be reliably recognised based on behavioural metrics, derived from the user's mobile phone activity and from additional indicators, such as the weather conditions (data pertaining to transitory properties of the environment) and the personality traits. In addition, we provide evidence that daily stress can be reliably recognised based on behavioural metrics, derived from the user's mobile phone activity (data concerning permanent dispositions of individuals). For a scenario involving recognising two classes of everyday stress, our multifactorial statistical model, which is not dependent on the characteristics of the individual being studied, achieves an accuracy score of 72.28 percent. Because of its greatly compressed and low-dimensional feature space, the model is easy to apply for the vast majority of multimedia applications (32d). In addition, we determine and talk about the signs that have a high degree of predictive value.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

Bimal Viswanath† Alan Mislove Meeyoung Cha Krishna P. Gummadi – For the purpose of capturing this idea in this paper, conduct research on how activity between users in the Facebook social network has evolved over time. The strength of ties shows a general pattern of diminishing activity as the social network link matures, as well as the fact that there is a tendency for links in the activity network to rapidly arrive and go over the course of time. For instance, just thirty percent of user pairings on Facebook engage with each other in a consistent manner from one month to the next. It is interesting to note that despite the quick rate of change observed in the activity network's links during the course of the study; several graph-theoretic features of the activity network were found to be unaffected.

I.-R. Glavan, A. Mirica, and B. Firtescu - Tools that are part of social media are widely used in online communication and are gaining popularity as a part of the communication process that takes place between citizens and public institutions. The purpose of this research is to undertake an investigation on the manner in which Official Statistical Institutes use social media to communicate with members of the public and to disseminate information. In order to determine which of the two social media platforms—Twitter or Facebook—is the more useful instrument for the process of communication in the area of official statistics, a technique called linear regression is used. In line with the findings of several previous studies, our research indicates that Twitter is a more effective platform than Facebook for increasing the interaction that exists between official statistics and ordinary persons. Next, using NodeXL, an analysis was performed on the characteristics of the Twitter network that were being discussed under the hashtag "official statistics." The results of this research highlighted the untapped potential of this network by official statistical agencies.

A. E. U. Berbano, H. N. V. Pengson, C. G. V. Razon, K. C. G. Tungcul, and S. V. Prado - Electroencephalography (EEG) signal analysis is utilised throughout the presentation of new research on brain engineering. The research focuses on the categorization of many types of stress, including emotional, mental, physical, and no stress at all. One of the primary contributors to a wide range of illnesses and conditions that affect one's health is stress. As a result, it is essential for individuals to keep an eye on their levels of stress. Because the human body accumulates stress in a variety of ways and responds to it in a variety of ways, we can divide stress into two categories: mental and emotional stress. It is generally agreed that the traditional approaches to classifying stress, such as through questionnaires and self-assessment exams, are subjective because they depend on the respondent's own perception. In light of this, the EEG signal analysis serves as the research project's objective method for categorising different types of stress. The Discrete Wavelet Transform is then used to do pre-processing, extraction, and selection of the characteristics included within the EEG recordings (DWT). After that, we use these features as inputs into an Artificial Neural Network (ANN) to classify the stress, and we validate the results using the K-fold Cross Validation Method. In the final step, the findings obtained through the software assisted method and those obtained through the traditional method are contrasted and compared. S. L. Bangare et al. [11-17] have worked in the brain tumor detection. N. Shelke et al [18] given LRA-DNN method. Suneet Gupta et al [19] worked for end user system. Gururaj Awate et al. [20] worked on Alzheimers Disease. P. S. Bangare et al [21-23] worked on the object detection. Kalpana Thakare et al [24-29] have worked on various machine learning algorithms. M. L. Bangare et al. [30-31] worked on the cloud platform. Rajesaheb R. Kadam et al [32] and Sachindra K. Chavan et al. [33] have discussed security issues with cloud.

III. PROPOSED SYSTEM

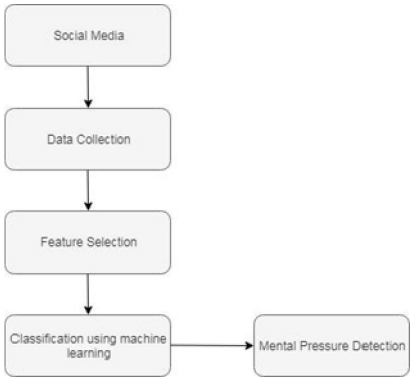

Figure 1. System Architecture

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

Classification Algorithm

Naïve Bayes:

Step 1: Convert the data set into a frequency.

Step 2: Create Likelihood table by finding the probabilities like Overcast probability = 0.29 and probability of playing is 0.64.

Step 3: Now, use Naive Bayesian equation to calculate the posterior probability for each class. The class with the highest posterior probability is the outcome of prediction.

For example:

Problem: Players will play if weather is sunny. Is this statement is correct?

We can solve it using above discussed method of posterior probability.

P(Yes | Sunny) = P(Sunny | Yes) * P(Yes) / P (Sunny)

Here we have P (Sunny |Yes) = 3/9 = 0.33, P(Sunny) = 5/14 = 0.36, P(Yes)= 9/14 = 0.64

Now, P (Yes | Sunny) = 0.33 * 0.64 / 0.36 = 0.60, which has higher probability.

Naive Bayes uses a similar method to predict the probability of different class based on various attributes. This algorithm is mostly used in text classification and with problems

4) Performance Evaluation: The evaluation can be done based on following factors:

i) Performance matrices such as TPR FPR Precision Recall etc.

ii) Impact of Different Sampling method

iii) Investigation of time related data

IV. RESULTS AND DISSCUSSION

Experimental evaluation is done to compare the proposed system with the existing system for evaluating the performance. The simulation platform used is built using Java framework (version jdk 8) on Windows platform. The system does not require any specific hardware to run; any standard machine is capable of running the application.

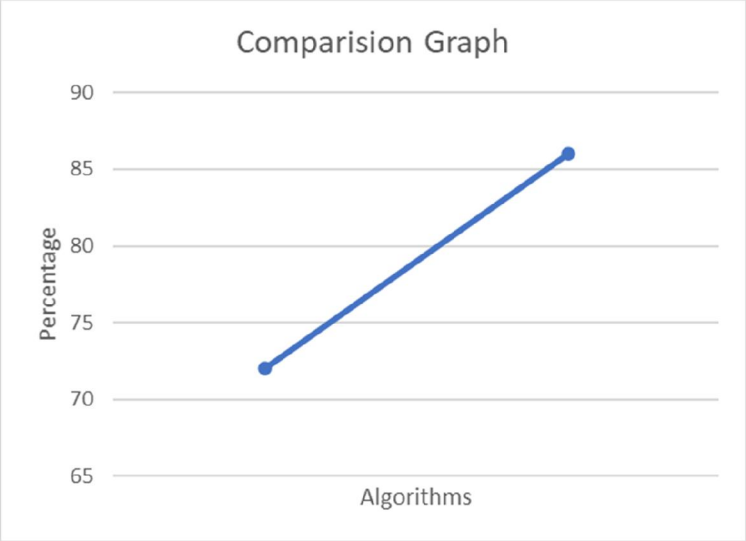

Figure 2. Comparison Graph

Sr. No.	Existing System	Proposed System
Algorithm	Binary Support vector machine	Naïve Bayes
Precision	60.2%	65.4 %
Recall	85.5%	89.7%
Accuracy	Prediction Accuracy:72%	Prediction Accuracy:86%

Table 1: Comparison Table

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

V. CONCLUSION

The health of individuals is put in jeopardy by the implementation of this planned technology, which detects potential online users with depression and stress automatically. Therefore, people who are suffering from depression can be discovered, and such users have the opportunity to receive assistance before they take any extreme actions that could have long-term consequences. We research the association between the states of psychological disturbance of users and their social interaction behaviour. We encourage the user for health precautions to send by mail for user interaction. The data that we use come from the social networks that exist in the actual world.

REFERENCES

[1]. Renata L. Rosa, Gisele M. Schwartz, Wilson V. Ruggiero, and Dem´ostenes Z. Rodr´ıguez, Senior Member, IEEE" A Knowledge-Based Recommendation System that includes Sentiment Analysis and Deep Learning" IEEE 2019.

[2]. Guang Yang, Haibo He, Fellow, IEEE, and Qian Chen" Emotion-Semantic Enhanced Neural Network" IEEE 2019.

[3]. M. Al-Qurishi, M. S. Hossain, M. Alrubaian, S. M. M. Rahman, and A. Alamri, Leveraging analysis of user behavior to identify malicious activities in large-scale social networks, IEEE Transactions on Industrial Informatics, vol. 14, no. 2, pp. 799-813, Feb 2018.

[4]. H. Lin, J. Jia, J. Qiu, Y. Zhang, G. Shen, L. Xie, J. Tang, L. Feng, and T. S. Chua, Detecting stress based on social interactions in social networks, IEEE Transactions on Knowledge and Data Engineering, vol. 29, no. 9, pp. 1820-1833, Sept 2017.

[5]. Budhaditya Saha, Thin Nguyen, Dinh Phung, Svetha Venkatesh" A Framework for Classifying Online Mental Health Related Communities with an Interest in Depression IEEE 2016.

[6]. Chun-Hao Chang, Elvis Saravia, Yi-Shin Chen" Subconscious Crowdsourcing: A Feasible Data Collection Mechanism for Mental Disorder Detection on Social Media 2016 IEEE/ACM

[7]. Andrey Bogomolov, Bruno Lepri, Michela Ferron, Fabio Pianesi, Alex (Sandy) Pentland, Daily Stress Recognition from Mobile Phone Data, Weather Conditions and Individual Traits IEEE Conference 2015

[8]. Bimal Viswanath, Alan Mislove Meeyoung, Cha Krishna P. Gummadi, On the Evolution of User Interaction in Facebook ACM 2011

[9]. I.-R. Glavan, A. Mirica, and B. Firtescu, The use of social media for communication. Official Statistics at European Level. Romanian Statistical Review, vol. 4, pp. 37-48, Dec. 2016.

[10]. E. U. Berbano, H. N. V. Pengson, C. G. V. Razon, K. C. G. Tungcul, and S. V. Prado, Classification of stress into emotional, mental, physical and no stress using electroencephalogram signal analysis, in 2017 IEEE International Conference on Signal and Image Processing Applications (ICSIPA), Sept 2017, pp. 11-14.

[11]. S. L. Bangare, G. Pradeepini, S. T. Patil, "Implementation for brain tumor detection and three dimensional visualization model development for reconstruction", ARPN Journal of Engineering and Applied Sciences (ARPN JEAS), Vol.13, Issue.2, ISSN 1819-6608, pp.467-473. 20/1/2018 http://www.arpnjournals.org/jeas/research_papers/rp_2018/jeas_0118_6691.pdf

[12]. S. L. Bangare, S. T. Patil et al, "Reviewing Otsu's Method for Image Thresholding." International Journal of Applied Engineering Research, ISSN 0973-4562, Volume 10, Number 9 (2015) pp. 21777-21783, © Research India Publications https://dx.doi.org/10.37622/IJAER/10.9.2015.21777-21783

[13]. S. L. Bangare, G. Pradeepini, S. T. Patil, "Regenerative pixel mode and tumor locus algorithm development for brain tumor analysis: a new computational technique for precise medical imaging", International Journal of Biomedical Engineering and Technology, Inderscience, 2018, Vol.27 No.1/2. https://www.inderscienceonline.com/doi/pdf/10.1504/IJBET.2018.093087

[14]. S. L. Bangare, A. R. Khare, P. S. Bangare, "Quality measurement of modularized object oriented software using metrics", ICWET '11: Proceedings of the International Conference & Workshop on Emerging Trends in Technology, February 2011, pp. 771–774. https://doi.org/10.1145/1980022.1980190.1.

[15]. S. L. Bangare, G. Pradeepini and S. T. Patil, "Brain tumor classification using mixed method approach," 2017 International Conference on Information Communication and Embedded Systems (ICICES), 2017, pp. 1-4, doi: 10.1109/ICICES.2017.8070748.

[16]. S. L. Bangare, S. Prakash, K. Gulati, B. Veeru, G. Dhiman and S. Jaiswal, "The Architecture, Classification, and Unsolved Research Issues of Big Data extraction as well as decomposing the Internet of Vehicles (IoV)," 2021 6th International Conference on Signal Processing, Computing and Control (ISPCC), 2021, pp. 566-571, doi: 10.1109/ISPCC53510.2021.9609451.

[17]. S. L. Bangare, G. Pradeepini, S. T. Patil et al, "Neuroendoscopy Adapter Module Development for Better Brain Tumor Image Visualization", International Journal of Electrical and Computer Engineering (IJECE) Vol. 7, No. 6, December 2017, pp. 3643~3654. http://ijece.iaescore.com/index.php/IJECE/article/view/8733/7392

[18]. N. Shelke, S. Chaudhury, S. Chakrabarti, S. L. Bangare et al. "An efficient way of text-based emotion analysis from social media using LRA-DNN", Neuroscience Informatics, Volume 2, Issue 3, September 2022, 100048, ISSN 2772-5286, https://doi.org/10.1016/j.neuri.2022.100048 .

[19]. Suneet Gupta, Sumit Kumar, Sunil L. Bangare, Shibili Nuhmani, Arnold C. Alguno, Issah Abubakari Samori, "Homogeneous Decision Community Extraction Based on End-User Mental Behavior on Social Media", Computational Intelligence and Neuroscience, vol. 2022, Article ID 3490860, 9 pages, 2022. https://doi.org/10.1155/2022/3490860.

[20]. Gururaj Awate, S. L. Bangare, G. Pradeepini and S. T. Patil, "Detection of Alzheimers Disease from MRI using Convolutional Neural Network with Tensorflow",arXiv, https://doi.org/10.48550/arXiv.1806.10170

[21]. P. S. Bangare, S. L. Bangare, R. U. Yawle and S. T. Patil, "Detection of human feature in abandoned object with modern security alert system using Android Application," 2017 International Conference on Emerging Trends & Innovation in ICT (ICEI), 2017, pp. 139-144, doi: 10.1109/ETIICT.2017.7977025.

[22]. P. S. Bangare and S. L. Bangare. "The Campus Navigator: An Android Mobile Application." International Journal of Advanced Research in Computer and Communication Engineering 3, no. 3 (2014): 5715-5717.

[23]. P. S. Bangare, N. J. Uke, and S. L. Bangare, "An approach for detecting abandoned object from real time video." International Journal of Engineering Research and Applications (IJERA) 2.3 (2012): 2646-2649.

[24]. Kalpana S. Thakare, Viraj Varale, "Prediction of Heart Disease using Machine Learning Algorithm", Bioscience Biotechnology Research Communications (Special issue) Volume 13, Issue 12, 2020 (Dec 2020 issue).

[25]. Kalpana S. Thakare, A. M. Rajurkar, "Shot Boundary Detection of MPEG Video using Biorthogonal Wavelet Transform", International Journal of Pure and Applied Mathematics, Volume 118, No. 7, pp. 405-413, ISSN: 1311-8080 (printed version); ISSN: 1314-3395 (on-line version), url: http://www.ijpam.eu

[26]. Kalpana S. Thakare, A. M. Rajurkar, R. R. Manthalkar, "Video Partitioning and Secured Key frame Extraction of MPEG Video", Proceedia Computer Science Journal, Volume 78, pp 790-798, Elsevier, 2016. Scopus DOI: htpp://10.1016/j.procs.2016.02.058, www.sciencedirect.com/science/article/pii/S1877050916000600

[27]. Kalpana S. Thakare, A. M. Rajurkar and R. R. Manthalkar, "Content based Video Retrieval using Latent Semantic Indexing and Color, Motion and Edge Features", International Journal of Computer Applications 54(12):42-48, September 2012, Published by Foundation of Computer Science, New York, USA. DOI: 10.5120/8621-2486

[28]. Kalpana S. Thakare, Archana M. Rajurkar, R. R. Manthalkar, "A Comprehensive System Based on Spatiotemporal Features Such as motion, Quantized Color and Edge Features", International Journal of Wireless and Microwave Technologies (IJWMT) ISSN 1449 (Print), ISSN: 2076-9539 (Online), Vol.1, No.3, June. 2011, DOI: 10.5815 /ijwmt

[29]. Kalpana S. Thakare, Archana M. Rajurkar, Dr. R. R. Manthalkar, "An effective CBVR system based on Motion, Quantized color and edge density features", International Journal of Computer Science & Information Technology (IJCSIT), ISSN 0975 – 3826, Vol 3, No 2, April 2011 DOI: 10.5121/ijcsit.2011.3206 78.

[30]. M. L. Bangare, "Attribute Based Encryption And Data Integrity For Attack on Cloud Storage", Journal of Analysis and Computation (JAC), (An International Peer Reviewed Journal), www.ijaconline.com, ISSN 0973-2861, ICASETMP-2019, pp.1-4. http://www.ijaconline.com/wp-content/uploads/2019/07/ICASETMP67.pdf

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

[31]. M. L. Bangare, Sarang A. Joshi, "Kernel interpolation-based technique for privacy protection of pluggable data in cloud computing", International Journal of Cloud Computing, Volume 9, Issue 2-3, pp.355-374, Publisher Inderscience Publishers (IEL).

[32]. Rajesaheb R. Kadam and Manoj L. Bangare, "A survey on security issues and solutions in live virtual machine migration", International Journal of Advance Foundation and Research in Computer (IJAFRC), (December, 2012). ISSN (2014), pp.2348-4853.

[33]. Sachindra K. Chavan, Manoj L. Bangare, "Secure Data Storage in Cloud Service using RC5 Algorithm", International Journal of Recent Technology and Engineering (IJRTE), ISSN: 2277-3878, Volume-2, Issue-5 November 2013, pp.139-144.