International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

Indian Student's Attitude Analysis Towards Information and Communication Technologies

Sapna Bhaskar Tanpure[1]

[1]*Assistant Professor, Sanmati Engineering College, Washim, (M.S.), India*

Abstract: Information and Communication Technologies (ICT) broadly refers to tools and services that handle and communicate information. Some of the most common examples of ICT are mobile phones and televisions. The ICT equips audio-visual teaching methods, which boost learners' knowledge retention and interest levels. This paper proposed a novel futuristic approach to support educational informatics and overcome the conventional system of attitude measures. Here we have performed descriptive and inferential statistical analysis for the prediction of Indian graduation students' attitudes towards ICT and Mobile Technology (MT) in education with primary data samples. The analysis includes a significant predictive model to identify the attitude of students towards technology. The present approach not only explored the technology's impact but also predicted students' opinions. The concept of an online awareness model may overcome the traditional method. In data analysis, the Linear Regression Model (LRM) has substantiated that the educational benefit explained the attitude significantly, and a significant positive association was discovered using the Pearson Correlation (PC) with a value of 0.75. The LRM model projected the nine most significant educational benefits of ICT and MT, which affected the attitude of the Indian student towards technology. We have proposed technology aids in building online predictive model wires with real-time prediction.

Keywords: Data Analysis, ICT, Indian Student's Attitude, ICT in Education, etc.

I. INTRODUCTION

To make a sustainable technology in an educational, the attitude toward likeness and dislikes exceedingly matters. Educational institutions need to evaluate the attitude continually, and obviously, it must be highly positive towards technology to make it sustainable. Information and Communication Technologies (ICT) enhances the learning power of a student to support education. Due to this, educational institutions are providing the latest technological facility to improve education quality. To analyze and explore the attitude, experiences, and behaviour of users towards the newest ICT, increasing sharply and predictive statistical modelling is also trending to identify unseen patterns from the educational datasets. In this, both regression and classification played a very significant role. Regression techniques have been used for decades to determine the power and association between the dependent variable and independent variables.

II. LITERATURE SURVEY

Various investigators have contributed to disciplines using regression models. Regression is a data mining function that predicts or estimates a number [1]. A statistical analysis helped to explore students' attitudes towards using ICT in a social constructivist environment [2]. Divergence in attitude showed between the significance of specific and general attitudes towards technology [3], and the technology tool enhanced the perspective of students towards professional development [4].

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

Based on the residential location, expert opinions of students and teachers were predicted towards ICT [5], [6]. Multiple regression, including factor analysis, played well to evaluate the intention to use ICT collaborative tools in a social constructivist environment [7]. With the Competitive attitude scale (Anxiety, Linking, Confidence, and Usefulness), the attitude of students was analyzed using regression modelling [8]. Manners of students were predicted based on their online activities on a learning platform [9] Also, multiple linear regression identified the student's academic performances [10]. The technology awareness identification models with machine learning for real-time [11], and opinion identification with significant features were proposed with the regression analysis [12]. Moreover, belonging literature was premeditated to predict the ICT Skills and usability [13], ICT Experience [14], and technology integration [15]. Further, unsupervised machine learning (clustering) identified a valuable factor that predicted the future employment of students after passed their graduation [16]. Also, the same procedure used to check the financial sustainability of the institution, which outputted the age and city is crucial to promoting graduate programs. Additionally, three decision tree variants (J48, Random Tree, and REP tree) were applied to identify academic performance based on social, demography, educational, motivation, study skills, and personal relationships.

The researcher proved that the J48 tree overtook others [17]. Further, more related kinds of literature were also studied before executed experiments [18]. Additionally, we studied the latest research study from the prediction perspective. A novel semi-supervised learning framework was proposed, which integrates both survival analysis and game theory for link prediction [19]. The hybrid methods were also presented to recognize the data patterns that combined discriminative features, feature combinations, and local random walk models [20]. A Graph k-Mean framework was presented in leader identification in social media networks with multi-objective optimization [21].

III. RESEARCH MOTIVATION

The university or educational institutes need to know the best ICT for the betterment of students, for such analysis and prediction of students' choice for ICT prediction systems, are required to help the educational institutes authorities to understand the best ICT. Various manual and online survey models are available but had not described the online models with significant features to predict attitudes. Here we have proposed a few student demography identification models for real-time development [6], [16].

These predictive models had not proposed significant features and even had not focused on the online perception measurement. Motivated by this research gap, the present paper explored the effects of technology benefits on attitude and predicted the professional attitude supporting various data transformation techniques. We have proposed transformed predicted models to deploy a future web-based system of the university. Further, the proposed statistical model is the base model with significant features for developing that real-time environment at the university website or on a separate module. Therefore, the use of technology in classrooms and schools is still often superficial and not meeting the potential of technology as envisioned by education reformers and researchers in the field. However, when technology projects have been implemented successfully in educational practice and shown beneficial impacts, sustainability within similar contexts is not guaranteed [22].

A statistical study plays a vital role in deciding the significant attributes before the development of any technology. To make it sustainable for a long time, we need to analyze the continuing opinion of stakeholders. Therefore, we are recommending the model which is itself a viable solution in educational technology to make a real-time web-based opinion analyzer.

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

IV. PROPOSED METHODS

As per the finding from the literature survey, existing models only proposed the manual or hybrid students' attitude but it failed to convey the student's behaviour correctly. The present model with LRM with the two most prominent variables predicts the attitude of Indian students based on educational benefits provided by their university.

1. Data Collection and Variables

A total of 163 samples are analyzed, which were collected from one Indian private university using an online survey form. Collected samples were analyzed in IBM SPSS Statistics Version-25 [23], [24]. Stratified random sampling was used in data collection. Considering two primary factors, students' attitudes, and the educational benefits of trending technology, we asked students various questions about the attitude and educational benefits. A few missing values were tackled using substitute mean values of others. The value of instances was numeric, and variables have scaled on five points Likert-type scale. We framed a new factor variable named: attitude and educational benefit using the mean values of belonging variables (suggested by FA) and set measurement type to scale.

The demography of students belonged to Gender, Age, Locality, and Study level. Figure 1 shows the highest participation of males (137, 84%), and the least females have responded (26, 16%). Figure 2 shows the broad participation of the age count of >D30 (118, 72%). Figure 3 shows that the urban students (112, 31%) participated higher than rural students (51,69%). In Figure 4, the maximum number of students belonged to the Graduation course (137, 84%). The least count of students is observed who are doing PhD./ Others (10, 6%).

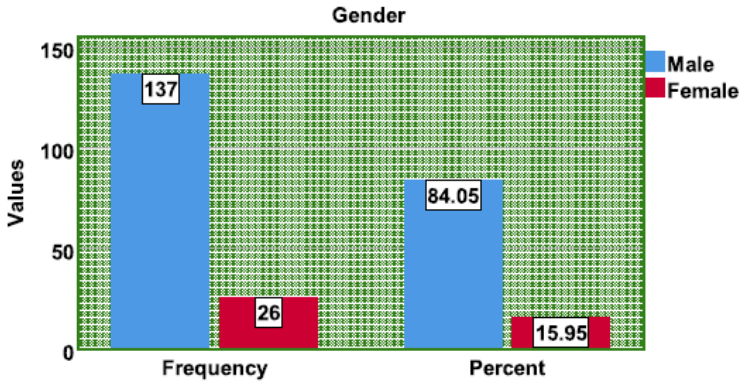

FIGURE 1: Number of participant students as per Gender

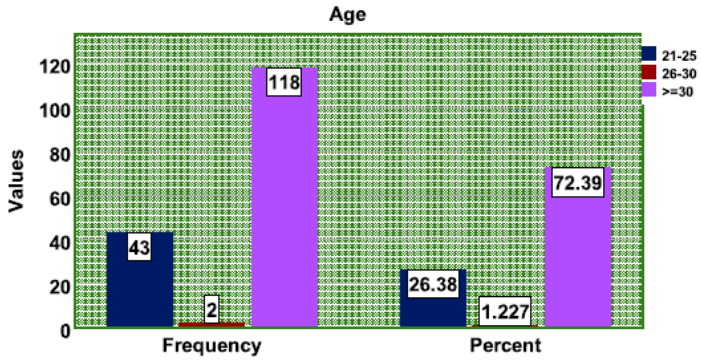

FIGURE 2: Number of participant students as per Age

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

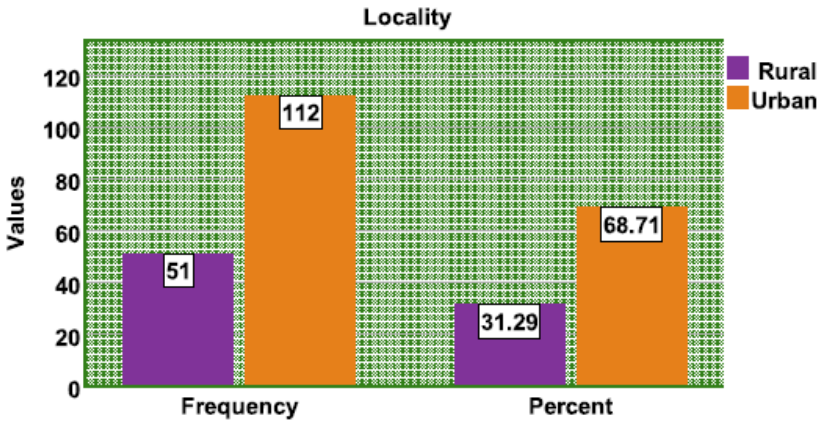

FIGURE 3. Number of participant students as per Locality

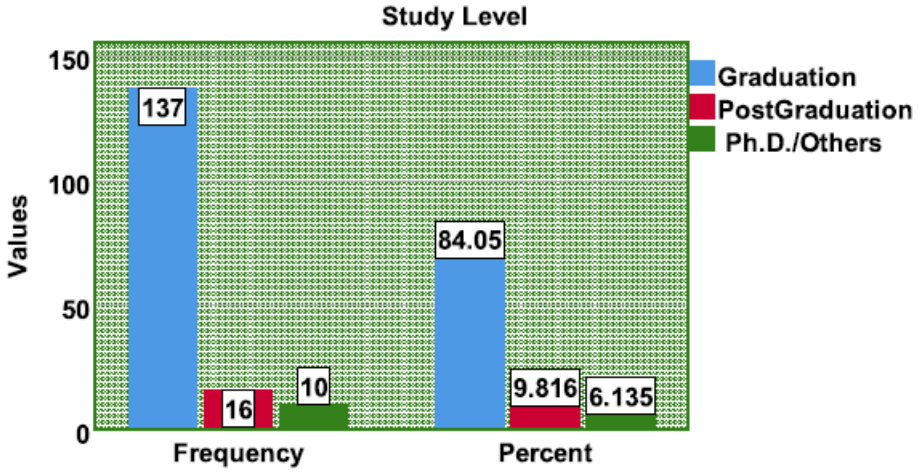

FIGURE 4: Number of participant students as per Study Level

2. Factor Analysis

We used exploratory Factor Analysis to make significant factors for further analysis. The parameters used for factor analysis: Principal Component Analysis (PCA), Varimax Method, Anti-Image, Convergence Iterations D 25, KMO (Kaiser-Meyer-Olkin), and Bartlett's test of sphericity.

Table 1: KMO and Bartlett's test

Particular	Value
KMO	0.942
Approximate Chi-Square	210.9
df	105
Sig.	0.0000
Variance	72%

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

Table 1 shows the overall adequacy of collected samples against each variable which is calculated at 0.942. Hence, the partial correlations among variables are slight. The lack of an identified correlation matrix proved with evident significant ($p < 0.05$) value of Bartlett's sphericity. The total cumulative variance explained 72% of the participants' scores. Anti-image matrices store the two values: Anti-image co-variances and Anti image correlation on rows and variables on columns. The measure of sample adequacy (a) for individual variables is defined by the KMO and Communality measures. The commonality “uniqueness'' is reproduced variances from the factors and proportion of each variable's variance. We considered the significant variables KMO having greater than 0.60.

Table 2: KMO and Communality

Code	KMO	Communalities
Q1	0.897a	0.759
Q2	0.899a	0.759
Q3	0.936a	0.676
Q4	0.955a	0.590
Q5	0.935a	0.792
Q6	0.923a	0.769
Q7	0.952a	0.731
Q8	0.955a	0.684
Q9	0.952a	0.746
Q10	0.928a	0.689
Q11	0.949a	0.642
Q12	0.942a	0.753
Q13	0.926a	0.791
Q14	0.940a	0.709
Q15	0.935a	0.767

In Table 2, the variables (Q1-Q6) relate to attitude, and the variables (Q7-Q15) belong to the educational benefits of ICT. Except for the only two variables, “Promotes independent learning'” and “Informative and quality-based study,'” all variables have excellent KMO.

Further, the commonalities of variables were found greater than 0.50. The five variables of attitude and four variables of educational benefit have greater than 0.70 communalities. Figure 5 visualizes the total number of PCA components with spotting Eigenvalues. It can see that the Eigen score of the 1st and 2nd components of the model has greater than 1. The leftmost first component has an Eigenvalue of 9.455, and the second component has an Eigenvalue of 1.337. Therefore, we considered these powerful components for analysis. The rest of the components dropped out caused of the lowest Eigen scores.

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

Figure 6 displays the rotated space of two extracted PCA components. The first component is PCA-1 (green stars) that points to attitude variables, and PCA-2 (Blue circles) is the second principal component that depicts the educational benefit variables. Transparently, both components are independents of each other, but indoor variables are highly correlated. Thus, factor analysis framed an instrumental group of variables for further investigation.

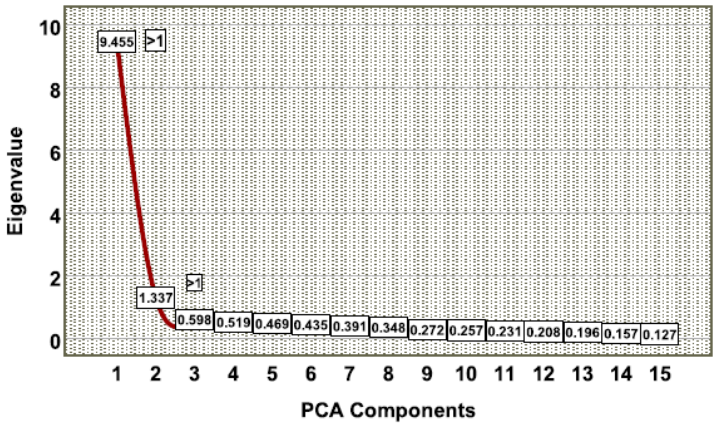

Figure 5: PCA Components

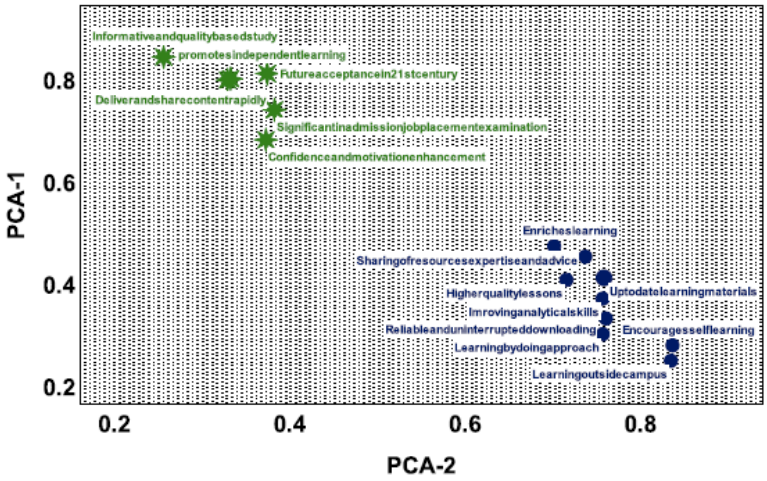

Figure 6: Features of PCA Components on Rotated Space

IV. CONCLUSION

This paper used the LRM to predict the attitude of students towards the technology for developing new sustainable technology awareness web applications. Embedding the LRM attitude predictive model may be given an online report to the university management and technical administrator about the current scenario of technology impact. An exploratory FA method advocated two significant components to build the LRM. The PCA-1 and PCA-2 have the Eigenvalue of 9.455 and 1.337, respectively. PCA-1 holds the six variables that belonged to attitude, and PCA-2 holds the nine educational benefits. More than 60% of the KMO and 50% of the commonalities of each variable proved the strength of the sample adequacy.

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

According to the CA model, the respective variables explained the 77.6% variance. It also confirmed that the students disagreed with the variable “High-quality lesson'” Nobody found strongly disagreed with the variables. Also, it revealed that all students liked the instrument variables, and many of them were undecided too. We used three types of data transformation techniques in the present study to gain better results. We found the vital role of transformation in making a significant LRM. A highly positive response towards technology was observed using the mean scores, and less variation was confirmed due to less dispersion. The SQRT transformation made positive skewness in the attitude variable made fit to execute the LRM. The student's attitude increases with providing the educational benefit about ICT proven with a highly positive correlation value of PC. The authors recommended nine innovative educational benefits, which make students’ attitudes higher towards ICT. Both the SQRT and the Log transformation enhanced the correlation value.

The LRM also proved a significant linear relationship between the educational benefit and students’ attitudes towards ICT in Indian higher education. Due to a substantial explanation provided with the educational benefit to predict mood, we proposed the model to be online deployed, which affected the student's attitude towards the ICT of university students.

REFERENCES

[1] G. Sujatha, S. Sindhu, and P. Savaridassan, ``Predicting Students' Performance using Personalized Analytics,'' Int. J. Pure Appl. Math., vol. 119, no. 12, pp. 229_238, 2018. [Online]. Available: https://acadpubl.eu/hub/ 2018-119-12/articles/7/1592.pdf

[2] Y. Silin and D. Kwok, ”A Study of Students' Attitudes Towards using ICT in a Social Constructivist Environment,'' Australas. J. Educ. Technol., vol. 33, no. 5, pp. 50_62, Dec. 2016, doi: 10.14742/ajet.2890.

[3] N. Antonio, M. Arantzamendi, J. López-Fidalgo, A. Gea, A. Acitores, L. Arbea, and C. Centeno, ``Student's Inventory of Professionalism (SIP): A Tool to Assess Attitudes Towards Professional Development based on Palliative Care Undergraduate Education,'' Int. J. Environ. Res. Public Health, vol. 16, no. 24, pp. 1_12, 2019, doi: 10.3390/ijerph16244925.

[4] D. Francisco and J. María, “Identification of Variables that Predict Teachers' Attitudes Toward ICT in Higher Education for Teaching and Research: A Study with Regression,” Sustainability, vol. 12, no. 4, pp. 1_14, 2020, doi: 10.3390/su12041312.

[5] C. Verma V. Stoffová, and Z. Illés, ``Prediction of Residence Country of Student Towards Information, Communication and Mobile Technology for Realtime: Preliminary Results,'' Procedia Comput. Sci., vol. 67C, pp. 224_234, Jan. 2020, doi: 10.1016/j.procs.2020.03.213.

[6] C. Verma, Z. Illés, and V. Stoffová, ``Predictive Modeling to Predict the Residency of Teachers using Machine Learning for the Real-time,'' in Proc. FTNCT CCIS. Chandigarh, India: Springer, 2020, pp. 592_601, doi: 10.1007/978-981-15-4451-4_47.

[7] D. Kwok and S. Yang, ``Evaluating the Intention to use ICT Collaborative Tools in a Social Constructivist Environment,'' Int. J. Educ. Technol. Higher Edu., vol. 14, no. 1, pp. 1_14, Dec. 2017, doi: 10.1186/s41239-017-0070-1.

[8] J.-P. Niyigena, Q. Jiang, A. S. M. T. Hasan, D. Ziou, H. Chen, and P. Wang, ``ICT Usage and Attitudes Among EAC Undergraduate Student’s” A Case Study,'' IEEE Access, vol. 6, pp. 42661_42674, 2018, doi: 10.1109/ACCESS.2018.2854925.

[9] B. Daniel, ``Background Similarities as a way to Predict Students' Behaviour,'' Sustainability, vol. 11, no. 24, pp. 1_13, 2017, doi: 10.3390/su11246883.

[10] O. D. Oyerinde and P. A. Chia, ``Predicting Students' Academic Performances: A Learning Analytics Approach using Multiple Linear Regression,” Int. J. Comput. Appl., vol. 157, no. 4, pp. 37_44, Jan. 2017, doi: 10.5120/ijca2017912671.

[11] C. Verma, V. Stoffová, and Z. Illés, ``Prediction of Students' Awareness Level Towards ICT and Mobile Technology in Indian and Hungarian University for the Real-time: Preliminary Results,'' Heliyon, vol. 5, no. 6, pp. 1_9, Jun. 2019, doi: 10.1016/j.heliyon. 2019.e01806.

International Journal of Ingenious Research, Invention and Development

ISSN (Online) 2583 648X

Volume 1 | Issue 2 | February 2023

Scientific Journal Impact Factor (SJIF 2023) = 3.647

[12] C. Verma, Z. Illés, V. Stoffová, and V. Bakonyi, ``Opinion Prediction of Hungarian Students for Real-time E-learning systems: A Futuristic Sustainable Technology-based Solution,'' Sustainability, vol. 12, no. 16, pp. 1_16, Jun. 2020, doi: 10.3390/su12166321.

[13] J. C. Verhoeven, "Predicting ICT Skills and ICT use of University Students," in Encyclopedia of Education and Information Technologies (Technology Acceptance in Education), A. Tatnall, Ed. Melbourne, VIC, Australia: Springer, 2020, doi: 10.1007/978-3-319-60013-0_226-1.

[14] D. Akaslan, and E. L. C. Law, ``Analysing the Relationship Between ICT Experience and Attitude Toward E-learning,'' in 21st Century Learning for 21st Century Skills (Lecture Notes in Computer Science), A. Ravenscroft, S. Lindstaedt, C. D. Kloos, D. Hernández-Leo, Eds. Berlin, Germany: Springer, 2020, pp. 365_370, doi: 10.1007/978-3-642-33263-0_28.

[15] R. Christensen, ``Effects of Technology Integration Education on the Attitudes of Teachers and Students,'' J. Res. Technol. Edu., vol. 34, no. 4, pp. 411_433, Jun. 2002, doi: 10.1080/15391523.2002.10782359.

[16] F. J. García-Peñalvo, J. Cruz-Benito, M. Martín-González, A. Vázquez-Ingelmo, J. C. Sánchez-Prieto, and R. Therón, ``Proposing a Machine Learning Approach to Analyze and Predict Employment and its Factors,'' Int. J. Interact. Multimedia Artif. Intell., vol. 5, no. 2, pp. 39_45, 2018, doi: 10.9781/ijimai.2018.02.002.

[17] K. H. Alaa, A. S. Hashim, and W. A. Awadh, "Predicting Student Performance in Higher Education Institutions using Decision Tree Analysis," Int. J. Interact. Multimedia Artif. Intell., vol. 5, no. 2, pp. 26_31, 2018, doi: 10.9781/ijimai.2018.02.004.

[18] H. D. Taylor and U. A. Rickel, ``An Analysis of Factors Affecting School Social Integration,'' J. Negro Edu., vol. 50, no. 2, pp. 122_133, 2018, doi: 10.2307/2294847.

[19] Z. Bu, Y. Wang, H.-J. Li, J. Jiang, Z. Wu, and J. Cao, "Link Prediction in Temporal Networks: Integrating Survival Analysis and Game Theory,'' Inf. Sci., vol. 498, pp. 41_61, Sep. 2019, doi: 10.1016/j.ins.2019.05.050.

[20] A. Song, Y. Liu, Z.Wu, M. Zhai, and J. Luo, ``A Local Random Walk Model for Complex Networks Based on Discriminative Feature Combinations, ''Expert Syst. Appl., vol. 118, pp. 329_339, Mar. 2019, doi: 10.1016/j.eswa.2018.10.018.

[21] Z. Bu, H.-J. Li, C. Zhang, J. Cao, A. Li, and Y. Shi, "Graph K-means Based on Leader Identification, Dynamic Game, and Opinion Dynamics,'' IEEE Trans. Knowl. Data Eng., vol. 32, no. 7, pp. 1348_1361, Jul. 2020, doi: 10.1109/TKDE.2019. 2903712.

[22] S. D. Niederhauser, S. K. Howard, J. Voogt, D. D. Agyei, T. Laferriere, J. Tondeur, and M. J. Cox, ``Sustainability and Scalability in Educational Technology Initiatives,'' Res.-Informed Practice. Tech Know Learn, vol. 23, pp. 507_523, Aug. 2018, doi: 10.1007/s10758-018-9382-z.

[23] D. George, and P. Mallery, SPSS forWindows Step by Step: A Simple Guide and Reference 17.0 Update, 10th edition London, U.K.: Pearson, 2010.

[24] IBM. Accessed: Aug. 18, 2020. [Online]. Available: https://www.ibm.com/support/pages/downloading-ibm-spss-statistics-25.