Dr. Williamjeet Singh
Assistant Professor,
Department of Computer Science and Engineering,
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WORK EXPERIENCE

- Assistant Professor in Dept of CSE, Punjabi University, Patiala from 02-08-2013 to till date.

- Assistant Professor in Dept of CSE, Chitkara University, Rajpura from 07-04-2008 to 31-07-2013.

QUALIFICATION

PhD - Punjabi University, Patiala, 2015

MTech - 70.85% from Punjabi University, Patiala, 2007

BTech - 83.67% from BBSBEC (under PTU), Fatehgarh Sahib, Punjab, 2005

10+2 - 72% (PSEB) from Multani Mal Modi College, Patiala, 2001

10th - 79.07% (PSEB) from Modern Senior Secondary School, Patiala, 1999

OVERVIEW

RESEARCH AREAS

- Artificial Intelligence, Speech Technology and Indian Sign Language

PhD RESEARCH DOMAIN

- Cellular Networks, Algorithms and Optimization

EXPERIENCE

- 15 + years

ARTICLES PUBLISHED

- 05 (English/ Punjabi)

RESEARCH PAPERS PUBLISHED

- 40+ in National/International Conferences/Journals, Including SCI/Scopus Indexed

WORKSHOPS ATTENDED/ORGANIZED

- 20+

PhD STUDENTS UNDER GUIDANCE

- 05

MTech STUDENTS GUIDED

SPORTS

- Winning Team of Cricket Tournament held at Punjabi University, Patiala
- Won a Silver Medal in 100m race at Inter Faculty Sports Events held at Punjabi University, Patiala, 17th Novemeber, 2021.
- Won a Silver Medal in 400m race at Inter Faculty Sports Events held at Punjabi University, Patiala, 17th Novemeber, 2021.
- Won a Bronze Medal in Javelin Throw at Inter Faculty Sports Events held at Punjabi University, Patiala, 17th Novemeber, 2021.

ARTICLES PUBLISHED

1. Time Management (in English)
2. Thoughts - My Destiny (in English)
3. Present is Mine (in English)
4. Cellular Telephony (in Punjabi)
5. Key to Success in an Interview (in Punjabi)

MEMBER OF NATIONAL/INTERNATIONAL TECHNICAL SOCIETIES

- Institute of Electrical and Electronics Engineers (IEEE)
- Indian Society for Technical Education (ISTE)
- The Institution of Engineers (IEI)
- Punjab Science Academy
- Green ThinkerZ Society
- International Institute of Organized Research (I2OR), India
- International Association of Engineers (IAENG)
- International Association of Computer Science and Information Technology (IACSIT)

SESSIONS CHAIRED AT REPUTED INTERNATIONAL CONFERENCES

- International Conference on Technological Advancements and Innovations (ICTAI-2021), organized by Amity University, UP, 10-12 Nov, 2021.

- 1st Online International Seminar on Ensuring Certainty in Uncertain Times: Coping with COVID-19 Pandemic organized by Dept of Social Work, Punjabi University, Patiala, Punjab, 19th June, 2020.
- International Conference on Applications of AI and Machine Learning, 2020 (ICAML-20), organized by Dept of CSE, Punjabi University, Patiala on 21-22 May, 2020.
- International Conference on Recent Trends in Computer Science and Information Technology (RTCSIT-2016), organized by PG Dept of Computer Science, Guru Nanak College Budhlada, Mansa, Punjab on 20-21 August, 2016.

REVIEWER AT REPUTED INTERNATIONAL JOURNALS

- Journal of King Saud University: Computer and Information Service, Elsevier, Impact Factor: 13.473
- Multimedia Tools and Applications, Springer, Impact Factor: 2.757

REVIEWER AT REPUTED INTERNATIONAL CONFERENCES

- 2nd International Conference on Computer Science, Engineering and Applications, 2022 (ICCSEA-22), organized by Department of Computer Science and Engineering, GIET University, Gunupur, Odisha, India ((technically co-sponsored by IEEE, Kolkata section) on 8th Septemebr, 2022. IEEE Conference Record No: #54677.
- 3rd International Conference on Advances in Information Communication Technology, 2021 (AICTC-21), organized by BMK Global Foundation in Association with CSI, Udaipur Chapter on 20-21 Dec, 2021.
- 3rd International Conference on Advances in Computing, Communication Control and Networking, 2021 (ICAC3N-21), organised by Dept of CSE, Galgotia College of Engineering and Technology, Greater Noida, Uttar Pradesh, India (technically co-sponsored by IEEE UP section) on 17-18 Dec, 2021. IEEE Conference Record No: #53548
- International Conference on Applications of AI and Machine Learning, 2020 (ICAML-20), organized by Department of Computer Science and Engineering, Punjabi University, Patiala on 21-22 May, 2020.

RESEARCH PROJECTS

- Research project titled "Automatic conversion of speech to Indian sign language for communication and education of hearing impaired people" is going on which was sponsored by Department of Science and Engineering (DST) - SYST, New Delhi in 2018.

DEVELOPMENT OF WEB BASED SOLUTIONS - Development of Android based Apps:

- AISL (All in Sign Language) an Android based App based on words and sentences integrating Indian Sign Language with English, Hindi and Punjabi (2021)
- Web based solution for teaching and learning modules for Hearing Impaired children (2021)
- WISL (World of Sign Language) an Android based App for beginners who wish to learn Indian Sign Language connecting it with English, Hindi and Punjabi (2020)
- Game based learning module for Hearing Impaired people in Indian Sign Language (2020)

FDPs/WORKSHOPS ATTENDED

- 7 Days Capacity Building Workshop on *Accreditation: Different Aspects and Key-Points* organized by Internal Quality Assurance Cell, Hindu Kanya College, Kapurthala from 01-05-2021 to 08-05-2021
- One week AICTE Training and Learning Academy (ATAL) recognized FDP on *Speech Processing using Deep Learning* organized by IIT, Dharwad from 28-12-2020 to 01-01-2021
- One week AICTE Training and Learning Academy (ATAL) recognized FDP on *Augmented Reality (AR)/Virtual Reality (VR)* organized by Dr. Mahalingam College of Engineering and Technology from 15-12-2020 to 19-12-2020
- One week AICTE recognized FDP on *Data Analytics using Python* organized by NITTTR Chandigarh from 18-05-2020 to 22-05-2020
- One week AICTE recognized FDP on *Internet of Things* organized by NITTTR Chandigarh from 23-09-2019 to 27-09-2019
- Two Days Workshop on *Latest Trends in Cloud Computing* at Department of Computer Science and Engineering, Punjabi University, Punjabi, Punjab from 11-12 April 2016
- One Day Seminar on *Fullbright-Nehru Fellowship Opportunities for Research and Professional Development in USA* organized by Research and Skill Development Centre at Punjabi University, Punjabi, Punjab on 5th April 2016
- One Day Workshop on *Computer Networking and Troubleshooting* at Department of Computer Science and Engineering, Punjabi University, Punjabi, Punjab on 4th March 2016
- Two weeks AICTE sponsored Short Term Course on *Cyber Threat Detection and Safety* organized by NITTTR, Chandigarh from 04-01-2016 to 15-01-2016
- 5 Days workshop on *Intricacies of Scientific Research: From Concept to Dissemination* organized by Chitkara University, Rajpura, Punjab from 16-07-2012 to 20-07-2012

- Workshop on *High Impact Teaching Skills* attested by Dale Carnegie and Associates, Inc. Trainer and Wipro from 27-02-2012 to 28-02-2012

- *Mission10X* workshop conducted at Swami Vivekanand Institute of Engineering and Technology, Rajpura, Punjab from 27-01-2012 to 02-02-2012

- One week course on *Artificial Neural Networks, Pattern Recognition Computer Vision and Multimedia Information Retrieval* organized under Indo-US Collaboration for Engineering Education at Jaypee University for Information Technology, Waknaghat, HP, India from 04-07-2011 to 08-07-2011

- Research Promotion Workshop on *Introduction to Graph and Geometric Algorithms* at Thapar University, Patiala, Punjab from 28-10-2010 to 30-10-2010

- One week course on *Teaching Engineering using MATLAB and Simulink organized under Indo-US Collaboration for Engineering Education* at Jaypee University for Information Technology, Waknaghat, Himachal Pradesh from 12-07-2010 to 14-07-2010

- Two weeks MHRD/AICTE sponsored Winter School on *Mobile Computing and Wireless Networks* organized by NITTTR, Chandigarh from 05-01-2009 to 16-01-2009

- Two weeks AICTE sponsored FDP on *Wireless Communication and Mobile Computing* organized by University School of Information Technology, GGSIPU, Delhi from 22-12-2008 to 02-01-2009

RESOURCE PERSON FOR FDPs/WORKSHOPS/WEBINARS

- *Artificial Intelligence for Entrepreneurs* at Acropolis Institute of Technology and Research, Indore, M.P. on 26th February, 2022.

- *Human Well-being and AI* at Sri Guru Granth Sahib World University, Fatehgarh Sahib, Punjab on 14th October, 2020.

- *Happiness and AI* at Galgotia Education Institute, Noida, UP on 30th September, 2020.

- *Web Designing and Development* at Desh Bhagat College, Bardwal Dhuri, Punjab on 13th June, 2020.

- *Impact of Lockdown on Teaching: Challenges and Solutions* at Sh. Lal Bahadur Shastri Mahila College, Barnala, Punjab on 8th June, 2020.

- *AI and its Research Applications* at Gokaraju Rangaraju Institute of Engineering and Technology, Hyderabad on 3rd June, 2020.

- *Rise of Artificial Intelligence and the Future* at Dept of CSE, RIMT University, Gobindgarh, Punjab on 5th May, 2020.

- *Role of Computers in Business Analytics* at Swift Technical Campus, Rajpura, Punjab on 24th November, 2016.

- *Innovative Trends in Market for Computers and Business* at Patel Institute of Management and Technology, Rajpura, Punjab on 23rd November, 2016.

- *Innovation in Research* at Chandigarh University, Gharuan, Mohali on 10th July, 2014 for FDP scheduled from 07-07-2014 to 12-07-2014.

- *Research Methodology* at Chitkara Institute of Engineering and Technology, Rajpura, Punjab on 17th January, 2011.

ORIENTATION/REFRESHER COURSES ATTENDED

- Refresher Program held at HRDC Guru Nanak Dev University, Amritsar, Punjab from 28-01-2022 to 11-01-2022

- Refresher Program held at HRDC Punjabi University, Patiala, Punjab from 01-12-2016 to 21-12-2016

- Orientation Program held at HRDC, Punjabi University, Patiala, Punjab from 08-04-2015 to 05-05-2015

MEMBER/COORDINATOR/OTHER RESPONSIBILITIES OF PAST EVENT/ACTIVITIES AT PUNJABI UNIVERSITY, PATIALA

1. Board of Studies

2. Sports Club

3. Techfest 2021

4. International Conference in Artificial Intelligence and Machine Learning

5. Discipline Committee

6. Technical Education Lecture Series

7. Mentor for BTech Students

8. Departmental DRB Committee

9. Departmental ACD Committee

10. NAAC/Annual reports/IQAC/API related activities

11. Admission and Counselling activities of B.Tech. and M.Tech.

12. Faculty-in-charge of Technical Labs

LIST OF PUBLICATIONS

SCI INDEXED JOURNALS:

- Jaskirat Kaur and and Williamjeet Singh, "*Tools, techniques, datasets and application areas for object detection in an image: a review*", Multimedia Tools and Applications, Springer, 23rd April, 2022.

- Amandeep Singh Dhanjal and Williamjeet Singh, "*An optimized machine translation technique for multi-lingual speech to sign language notation*", Multimedia Tools and Applications, Springer, 19th March, 2022.

- Amandeep Singh Dhanjal and Williamjeet Singh, "*An Automatic Machine Translation System for Multi-lingual Speech to Indian Sign Language*", Multimedia Tools and Applications, Springer, 6th December, 2021.

- Navroz Kahlon and Williamjeet Singh, "*Machine Translation from Text to Sign Language: A Systematic Review*", Universal Access in the Information Society, Springer, 3rd July, 2021.

- Williamjeet Singh and Jyotsna Sengupta, "*An Efficient Algorithm for Optimizing Base Station Site Selection to Cover a Convex Square Region in Cell Planning*", International Journal of Wireless Personal Communications, Springer, Vol. 68, February 2013.

SCOPUS INDEXED JOURNALS:

- Rishu Gupta and Williamjeet Singh, "*Integrating Dictionary Lookup Approach with FP Growth Algorithm for Emotion Mining in English Rhymes*", Solid State Technology, Volume-63, Issue-6, 2020.

- Saloni and Williamjeet Singh, "*Multilingual Speech to Text Conversion*", Advances in Mathematics: Scientific Journal,Volume-9, Issue-6, 2020.

- Rishu Gupta and Williamjeet Singh, "*Comparative Analysis of Emotion Mining Techniques*", Journal of Critical Reviews (JCR), Volume-7, Issue-15, 2020.

- Sheenam Malhotra and Williamjeet Singh, "*An Optimized Solution for Ranking Based On Data Complexity*", International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-8, Issue-11, September 2019.

- Jeenu Gupta and Williamjeet Singh, "*Dictionary Lookup Approach for Emotion Mining from Rhymes in English Language using Apriori Algorithm*", International Journal of Control Theory and Applications (IJCTA), ISSN: 0974-5572, Volume-9, Issue-20, pp. 185-191, 2016.

- Navdeep Kaur and Williamjeet Singh, "*Alcoholic Behavior Prediction through Comparative Analysis of J48 and Random Tree Classification Algorithms using WEKA*", Indian Journal of Science and Technology (IJST), ISSN: 0974-6846, Volume-9, Issue-32, 2016.

OTHER JOURNALS:

- Rishu Gupta and Williamjeet Singh, "*E-Tool: Online Emotion Mining Tool*", International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume-2, Issue-3, February 2021, ISSN (Online) 2581-9429.

- Amandeep Singh Dhanjal and Williamjeet Singh, "*An Automatic Conversion of Punjabi Text to Indian Sign Language*", EAI Endorsed Transactions on Scalable Information Systems, 12 June, 2020. (ESCI, Web of Science)

- Rajneet Kaur and Williamjeet Singh, "*Punjabi Speech based Searching in a Text Document*", International Journal of Engineering Research and Technology (IJERT), Volume 8, Issue 8, August 2019. (Waiting for SCOPUS approval since 2019)

- Ashu Bhardwaj and Williamjeet Singh, "*Smart Meter Data Analytics using Hadoop*", International Journal of Advanced Research in Science and Engineering (IJARSE), Volume-6, Issue-8, August, 2017, pp. 1322-1330, ISSN No. 2319-8354.

- Amrit Kaur and Williamjeet Singh, "*Modeling and Analysis of Queuing to Customers Management in Banking System using Simulation*", International Journal for Multi Disciplinary Engineering and Business Management (IJMDEBM), Vol. 5, No. 3, July-September, 2017, ISSN: 2348 – 2249.

- Amritpal Kaur and Williamjeet Singh, "*Analysis of Queuing to Customers Management in Banking System using Simulation*", International Journal of Advanced Research in Science and Engineering (IJARSE), Volume-6, Issue-7, July 2017.

- Sarpreet Kaur and Williamjeet Singh, "*Systematic Review of Crime Data Mining*", International Journal of Advanced Research in Computer Science (IJARCS), Volume-8, Issue-5, p1336-1342, May/June 2017.

- Ashu Bhardwaj and Williamjeet Singh, "*Systematic Review of Smart Grid Analysis*", International Journal of Advanced Research in Computer Science (IJARCS)", Volume-8, Issue-5, June 2017.

- Beant Kaur and Williamjeet Singh, "*Review on Heart Disease Prediction System using Data Mining Techniques*", International Journal on Recent and Innovation Trends in Computing and Communication (IJRITCC), Volume-2, Issue-10, October, 2014.

- Anurag Jindal and Williamjeet Singh, "*Data Mining in Education for Students Academic Performance: A Systematic Review*", ISSN 2277-3061, International Journal of Computers and Technology (IJCT), Vol. 13, No. 9, August 2014.

- Dheeraj Khera and Williamjeet Singh, "*A Review on Injury Severity in Traffic System using Various Data Mining Techniques*", International Journal of Computer Applications (0975 –8887) Vol.100, No.3, August 2014.

- Ravneet Jyot Singh and Williamjeet Singh, "*Data Mining in Healthcare for Diabetes Mellitus*", International Journal of Science and Research (IJSR), ISSN (Online): 2319-7064, Vol. 3, No. 7, July 2014.

- Williamjeet Singh and Jyotsna Sengupta, "*An Optimized Approach for Selecting an Optimal Number of Cell Site Locations in Cellular Networks*", International Journal of Computer Application (IJCA), Vol. 40, No. 8, pp. 10-16, February 2012.

- Williamjeet Singh and Jyotsna Sengupta, "*A Novel Approach for Selecting an Optimal Number of Cell Site Locations in Varying Geographic Regions for Cellular Networks*", Journal of Theoretical and Applied Information Technology (JATIT), Vol. 28, No. 1, pp. 16-21, June 2011.

- Williamjeet Singh and Jyotsna Sengupta, "*A New Methodology for Optimal Cell Site Selection in Varying Geographical Locations for Cellular Networks using Voronoi Diagram*", International Journal of Engineering Science and Technology (IJEST), NCICT Special Issue, pp. 99-101, February 2011.

- Williamjeet Singh and Jyotsna Sengupta, "*Performance Estimation of a Cell Site in Cellular Networks Using WiMax Technology*", International Journal of Information Sciences and Application (IJISA), Volume-2, Issue-3, pp. 417-420, November 2010.

- Williamjeet Singh and Jyotsna Sengupta, "*Optimal Cell Site Planning in Varying Geographic Regions for Cellular Networks*", International Journal of Computer Applications in Engineering, Technology and Sciences (IJ-CA-ETS), Volume-3, Issue-1, pp. 52-57, October 2010.

- Navdeep Kaur and Williamjeet Singh, "*Estimating the Severity Level of Alcohol Use in Future*", International Journal of Advanced Research in Computer Science (IJARCS), Volume-7, Issue-6, November, 2016.

- Prabhjot Kaur and Williamjeet Singh "*Comparative Analysis of Classification Techniques for Predicting Computer Engineering Students' Academic Performance*", International Journal of Advanced Research in Computer Science (IJARCS), Volume-7, Issue-6, 2016.

- Gurmeet Kaur and Williamjeet Singh, "*Prediction of Student Performance Using Weka Tool*", International Journal of Engineering Sciences (IJES), Volume-17, January, 2016.

- Beant Kaur and Williamjeet Singh, "*Analysis of Heart Attack Prediction System using Genetic Algorithm*", International Journal of Advanced Technology in Engineering and Science (IJATES), Volume-3, Issue-1, August, 2015.

CONFERENCES:

- Swati and Williamjeet Singh, "*A Brief Review on Sentiment Analysis*", 3rd International Conference on Innovative Trends in Electronics Engineering (ICITEE-2021), Punjabi University, Patiala, Punjab, India, 14th December, 2021. (**IEEE Chandigarh Subsection**)

- Jaskirat Kaur and Williamjeet Singh, "*An Approach Towards Indian Road Sign Detection System Using Deep Learning*", 3rd International Conference on Innovative Trends in Electronics Engineering (ICITEE-2021), Punjabi University, Patiala, Punjab, India, 14th December, 2021. (**IEEE Chandigarh Subsection**)

- Amandeep Singh Dhanjal and Williamjeet Singh, "*Comparative Analysis of Sign Language Notation Systems for Indian Sign Language*", International Conference on Advanced Computational and Communication Paradigms (ICACCP), Gangtok, India, 25-28 February, 2019. (**IEEE**)

- Amandeep Singh Dhanjal and Williamjeet Singh, "*Tools and Techniques of Assistive Technology for Hearing Impaired People*", International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COMITCon), Faridababd, India, 14-16 February, 2019. (**IEEE**)

- Rajneet Kaur and Williamjeet Singh, "*Speech based Retrieval System for Punjabi Language*", International Conference on Smart Systems and Inventive Technology (ICSSIT), Tirunelveli, India, 13-14 December, 2018 (**IEEE**)

- Ashu Bhardwaj and Williamjeet Singh, "*Systematic Review of Big Data Analytics in Governance*", International Conference on Intelligent Sustainable Systems (ICISS), Palladam, Tirupur, Tamil Nadu, India, 7-8 December, 2017, pp. 501-506. (**IEEE**)

- Sheena Rewari and Williamjeet Singh, "*Systematic Review of Crime Data Analytics*", International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI), Chennai, India, 21-22 September, 2017, pp. 3042-3045. (**IEEE**)

- Sarpreet Kaur and Williamjeet Singh, "*Systematic Mapping Study of Big Data Mining Tools and Techniques*," 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT), Delhi, India, pp. 1-7, July 3-5, 2017. (**IEEE**)

- Rekha and Williamjeet Singh, "*Sentiment Analysis of Online Mobile Reviews*", International Conference on Inventive Communication and Computational Technologies (ICICCT), Coimbatore, India, 10-11 March, 2017. (**IEEE**)

- Sarpreet Kaur, Sheena and Williamjeet Singh, "*Big Data Analysis Using RHadoop*", International Conference On Recent Trends In Computing (ICRTC), Punjabi University, Patiala, India, 30-31 August, 2016.

- Gurmeet Kaur and Williamjeet Singh, "O*ptimal Selection of Factors Influencing Student Academic Performance in Educational Data Mining*", International Conference On Recent Trends In Computing (ICRTC), Punjabi University, Patiala, India, 30-31 August, 2016.

- Rekha and Williamjeet Singh, "*A Survey on Sentimental Analysis Using Opinion Mining*", International Conference On Recent Trends In Computing (ICRTC), Punjabi University, Patiala, India, 30-31 August, 2016.

- Prabhjot Kaur and Williamjeet Singh, "*Implementation of Student SGPA Prediction System(SSPS) Using Optimal Selection of Classification Algorithm*", International Conference on Inventive Computation Technologies (ICICT), Coimbatore, India, 26-27 August, 2016. **(IEEE)**

- Gurmeet Kaur and Williamjeet Singh, "*Prediction of Student Performance using Data Mining*", National Seminar on I.T and Society, Khalsa College (ASR) of Technology and Business Studies, Mohali.

- Williamjeet Singh, "*A Review on Educational Data Mining: Current and Future Trends*", National Conference on Future Patterns in Information Technology, DAV College, Abohar, 4th December, 2015.

- Williamjeet Singh, "*Data Mining in Area of Drug Addiction: Current and Future Trends*", National Conference on Future Patterns in Information Technology, DAV College, Abohar, 4th December, 2015.

- Dheeraj Khera and Williamjeet Singh, "*Prediction and Analysis of Injury Severity in Traffic System using Data Mining Techniques*", National Conference on Advances in Computing Communication and Application (ACCA-2015) published in Special Issue of International Journal of Computer Applications (0975 –8887), 2015.

- Dheeraj Khera and Williamjeet Singh, "*Predication and Forecasting in Road Safety and Healthcare Systems using Data Mining Techniques*", National Conference on Emerging Trends in Engineering and Technology, Asra College of Engineering and Technology, Sangrur, 7-8 November, 2014.

- Williamjeet Singh and Jyotsna Sengupta, "*Cost Optimization for Designing a Cell Site Through Optimal Selection of Towers in varying Geographic Locations*", National Conference on Information Security and Networks, ISAN-2009, pp. 134-136, CIET, Rajpura.

- Williamjeet Singh and Jyotsna Sengupta, "*An Assortment of Performance and Optimization Parameters in Future Cellular Networks*", IEEE International Advance Computing Conference, IACC-09, pp. 2036-2040, Thapar University, Patiala. (**IEEE**)

- Williamjeet Singh and Jyotsna Sengupta, "*Various Issues and Their Importance Concerning the Fast Cell Site Location in Cellular Network*", International Conference on Wireless Networks and Embedded Systems, WECON-2008, pp. 589-593, CIET, Rajpura.

- Williamjeet Singh, "*Information Technology in Rural India: Challenges Ahead*", International Conference on Challenges and Opportunities in IT Industry, ICCII-2005, Punjab College of Technical Education, Baddowal, Ludhiana, Punjab.

BOOK CHAPTER(S):

- Williamjeet Singh and Saloni, "*Speech-Based Multilingual Translation Framework*", Chapter 12, Handbook of Intelligent Computing and Optimization for Sustainable Development, John Wiley & Sons, Inc., pp 249-259, 25th February, 2022.