(54) Title of the invention : AN ADAPTIVE MACHINE LEARNING FRAMEWORK FOR CYBERSECURITY THREAT DETECTION AND RISK MITIGATION

(51) International classification : H04L0009400000, G06N0020000000, G06F0016250000, G06N0003045000, A61B0005000000 (86) International Application No : NA Filing Date : NA (87) International Publication No : NA (61) Patent of Addition to Application Number : NA Filing Date : NA (62) Divisional to Application Number : NA Filing Date : NA	(71)**Name of Applicant :** 1)**Brijit Bhattacharjee** Address of Applicant :S/o. Mr. Prasenjit Bhattacharjee, Assistant Professor, Department of Computer Science and Engineering, Swami Vivekananda Institute of Science & Technology, Dakshin Gobindapur, Sonarpur, Kolkata – 700145 , West Bengal, India. Kolkata ----------- ----------- 2)**Dr. Nilesh Marathe** 3)**Dr. Shilpa Sonawani** 4)**Dr. Arnab Kundu** 5)**Indrajit Chakraborty** 6)**Rakeshkumar D. Vanzara** 7)**Devang Shantilal Pandya** 8)**Paresh Mahendrabhai Solanki** 9)**Dr. Nitish Das** 10)**Dr. Harsh Kumar** Name of Applicant : NA Address of Applicant : NA (72)**Name of Inventor :** 1)**Brijit Bhattacharjee** Address of Applicant :S/o. Mr. Prasenjit Bhattacharjee, Assistant Professor, Department of Computer Science and Engineering, Swami Vivekananda Institute of Science & Technology, Dakshin Gobindapur, Sonarpur, Kolkata – 700145 , West Bengal, India. Kolkata ----------- ----------- 2)**Dr. Nilesh Marathe** Address of Applicant :S/o. Mr. Ratnakar Sundar Marathe, Associate Professor, Department of Computer Science and Engineering (Data Science), Dwarkadas J. Sanghvi College of Engineering (DJSCE), Vile – Parle - 400056, Mumbai, India. Mumbai ----------- ----------- 3)**Dr. Shilpa Sonawani** Address of Applicant :W/o. Mr. Snehal Sonawani, Assistant Professor, Department of Computer Engineering and Technology, Dr. Vishwanath Karad M I T World Peace University, Survey No. 124, Paud Road, Kothrud, Pune - 411038, Maharashtra, India. Pune ----------- ----------- 4)**Dr. Arnab Kundu** Address of Applicant :S/o. Mr. Chandan Kundu, Assistant Professor, Department of Computer Science and Engineering – Cyber Security & Data Science, Brainware University, Barasat - 700125, Kolkata, West Bengal, India. Kolkata ----------- ----------- 5)**Indrajit Chakraborty** Address of Applicant :S/o. Mr. Bireswar Chakraborty, Assistant Professor, Department of Computer Science and Engineering, Techno International Batanagar, Ward No. 30, B7 - 360, New Gumar Gala, Maheshtala, Kolkata - 700141, West Bengal, India. Kolkata ----------- ----------- 6)**Rakeshkumar D. Vanzara** Address of Applicant :S/o. Mr. Dilipkumar Vanzara, Professor, Department of Information Technology, U V Patel College of Engineering, Ganpat University, Ganpat Vidyanagar, Mehsana - Gandhinagar Highway, Mehsana - 384012, Gujarat, India. Mehsana ----------- ----------- 7)**Devang Shantilal Pandya** Address of Applicant :S/o. Mr. Shantilal Pandya, Associate Professor, Department of Information Technology, U V Patel College of Engineering, Ganpat University, Ganpat Vidyanagar, Mehsana - Gandhinagar Highway, Mehsana - 384012, Gujarat, India. Mehsana ----------- ----------- 8)**Paresh Mahendrabhai Solanki** Address of Applicant :S/o. Mr. Mahendrabhai Solanki, Associate Professor, Department of Computer Engineering, , U V Patel College of Engineering, Ganpat University, Ganpat Vidyanagar, Mehsana - Gandhinagar Highway, Mehsana - 384012, Gujarat, India. Mehsana ----------- ----------- 9)**Dr. Nitish Das** Address of Applicant :S/o. Mr. Nirmal Das, Assistant Professor, Department of Computer Science and Engineering, M I T Art, Design and Technology University, Loni Kalbhor, Pune - 412201, Maharashtra, India. Pune ----------- ----------- 10)**Dr. Harsh Kumar** Address of Applicant :S/o. Mr. Dharm Singh, Professor, Department of Computer Science, School of Engineering and Technology, S G R R University Dehradun - 248001, Uttarakhand, India. Dehradun ----------- -----------

(57) Abstract :

An adaptive machine learning system for real-time cybersecurity threat detection and risk management is disclosed. The system integrates multiple modules, including data ingestion, feature extraction, model training, adaptive threat detection, and risk management, to provide an intelligent, self-improving approach to identifying and mitigating cyber threats. The data ingestion module collects and preprocesses diverse data sources, such as network logs, user behavior, and external threat feeds, while the feature extraction module uses advanced techniques to enhance detection accuracy. Machine learning models, trained on both historical and real-time data, are dynamically fine-tuned through an adaptive threat detection module that employs transfer learning and user feedback to evolve with changing threat landscapes. A risk management module assesses threat severity, calculates risk scores, and suggests actionable mitigations, delivering insights through dashboards and alerts. The system significantly reduces false-positive rates and response times, offering a robust solution for modern cybersecurity challenges.

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