CSE 543: Information Assurance and Security

Using Machine Learning to detect classifying Malware in IoT Systems

Group 14 Weekly Report - 3

Person prepared this report: All members of the group

Person approved this report: Amogh Manoj Joshi

Person submitted this report: Priyadarshini Venkatesan

List of members

1. Amogh Manoj Joshi (Group Leader)
2. Priyadarshini Venkatesan (Deputy Leader)
3. Vignan Varma Chekuri
4. Venkata Karthik Reddy Peddireddy
5. Siva Priya Bollineni
6. Anusha Akuthota
7. Sarika Naidu Chirki
8. Ramya Thota

Meeting Notes

02/02/2023: [7:30 pm - 8:00 pm] [Mode: Virtual]

- The group leader told the members to start summarizing the papers they had read in a detailed manner including the scope of the paper, the machine learning technique used, types of malware included in the study etc.
- This detailed summary was updated in the literature review sheet, which helped the group while preparing the final project proposal
- **Attendance:** All the members were present

02/04/2023: [8:30 pm - 9:30 pm] [Mode: Virtual]

- The group members connected via a call to prepare the project proposal. The main purpose of the meeting was to discuss the common aspects among the papers read so far and to prepare the scope and expected results section of the project.
- The individual tasks and responsibilities of the group members were revised and confirmed by the leader and deputy leader to maintain a clarity among the group before starting the project
- The members were requested to start documenting the in-depth study reports for the paper they have read and the evaluation pairings were also assigned
- **Attendance:** All the members were present

Tasks Summary

Task Number	Task Name	Description of Task	Member	Task Status
1	Malware Analysis	Categorizing the malware for IoT devices, analyzing the data sets.	All Members	Completed
2	Understanding ML Algorithms	Extended the research on different ML Algorithms.	All Members	Completed
3	Project Proposal	Briefly summarizing the papers read, and understanding the ML algorithms used and the malware.	All Members	Completed

Task Progress

Task Name	Member	Date and time of Review	Reviewer(s)	Mode of Review	Review Conclusion	Recommended Action
1) Malware Analysis	All the members of the group	02/05/2023	Amogh Manoj Joshi	Group Meeting	Satisfactory	Accepted
2) Understanding ML Algorithms	All the members of the group	02/05/2023	All the members of the group	Group Meeting	Satisfactory	Accepted
3) Project proposal	All the members of the group	02/05/2023	Priyadarshini Venkatesan	Group Meeting	Satisfactory	Accepted

Problems:

Faced by: The entire team

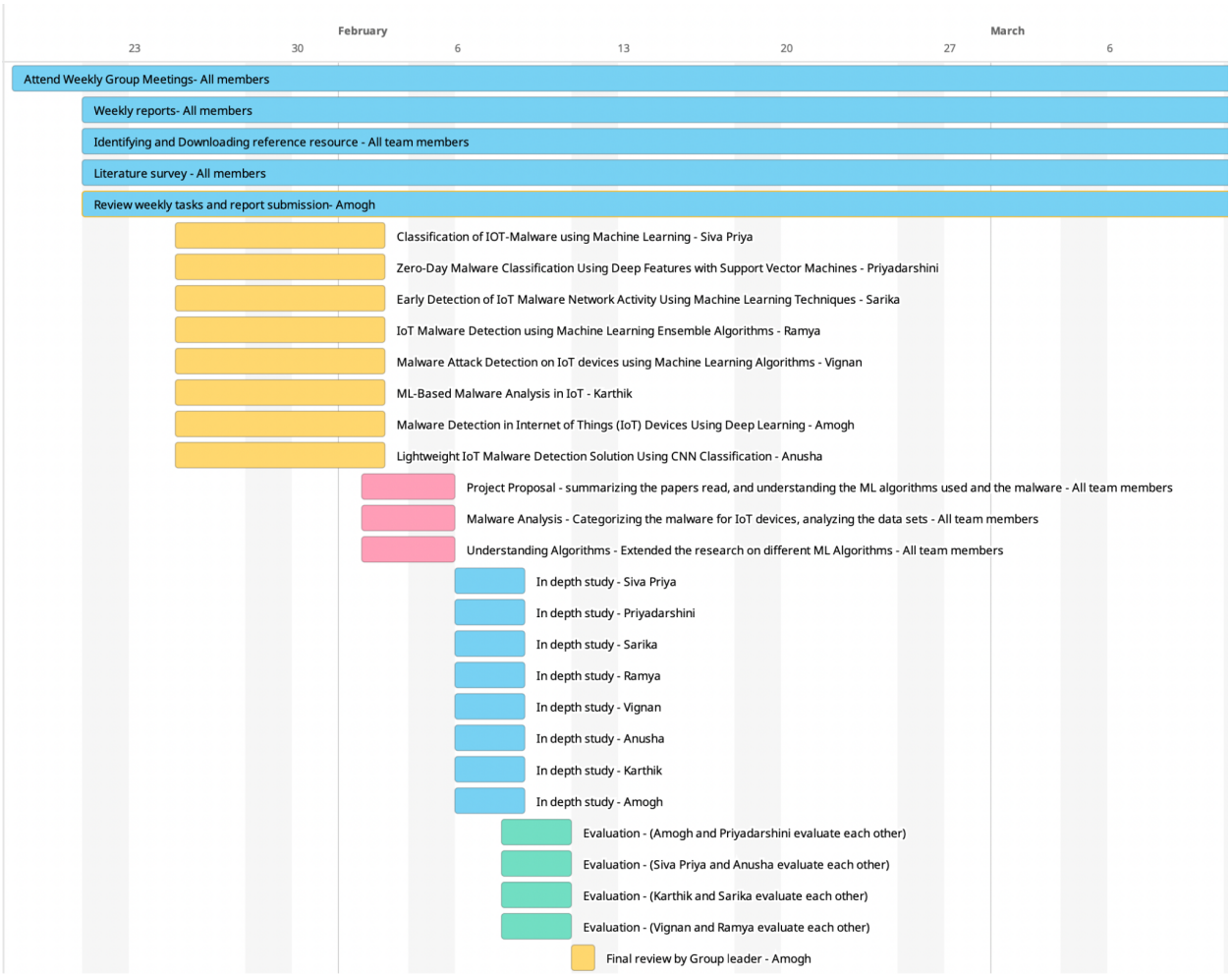
Status: Solved

Problems:

- After receiving multiple feedbacks from TA and Professor, we decided to comprehend our analysis on the various types of malware attacks rather than focusing on the intrusion attacks.
- As a team, we engaged in a broad range of malware types and ml algorithms for cybersecurity detection. Through in-depth summarization of multiple journals, we concluded on the various types of malware, as mentioned in our project proposal.

Gantt Chart:

[Link to Gantt Chart]



References:

In Depth:

1. F. Hussain, R. Hussain, S. A. Hassan and E. Hossain, "Machine Learning in IoT Security: Current Solutions and Future Challenges," in IEEE Communications Surveys & Tutorials, vol. 22, no. 3, pp. 1686-1721, thirdquarter 2020, doi: 10.1109/COMST.2020.2986444.
2. S. Madan and M. Singh, "Classification of IOT-Malware using Machine Learning," 2021 International Conference on Technological Advancements and Innovations (ICTAI), Tashkent, Uzbekistan, 2021, pp. 599-605, doi: 10.1109/ICTAI53825.2021.9673185.
3. R. El-Sayed, A. El-Ghamry, T. Gaber and A. E. Hassanien, "Zero-Day Malware Classification Using Deep Features with Support Vector Machines," 2021 Tenth International Conference on Intelligent Computing and Information Systems (ICICIS), Cairo, Egypt, 2021, pp. 311-317, doi: 10.1109/ICICIS52592.2021.9694256.
4. A. Kumar and T. J. Lim, "EDIMA: Early Detection of IoT Malware Network Activity Using Machine Learning Techniques," 2019 IEEE 5th World Forum on Internet of Things (WF-IoT), Limerick, Ireland, 2019, pp. 289-294, doi: 10.1109/WF-IoT.2019.8767194.
5. Santhadevi D, Janet B, “IoT Malware Detection using Machine Learning Ensemble Algorithms”, International Journal of Advanced Science and Technology (IJAST), vol. 29, no. 10s, pp. 8006-8016, Jun. 2020.
6. Achary, Rathnakar, and Chetan J. Shelke. "Malware Attack Detection on IoT Devices Using Machine Learning." In *Smart Data Intelligence: Proceedings of ICSMDI 2022*, pp. 11-22. Singapore: Springer Nature Singapore, 2022.
7. S. Riaz *et al.*, “Malware Detection in Internet of Things (IoT) Devices Using Deep Learning,” *Sensors*, vol. 22, no. 23, p. 9305, Nov. 2022, doi: 10.3390/s22239305.
8. A. M. N. Zaza, S. K. Kharroub and K. Abualsaud, "Lightweight IoT Malware Detection Solution Using CNN Classification," *2020 IEEE 3rd 5G World Forum (5GWF)*, Bangalore, India, 2020, pp. 212-217, doi: 10.1109/5GWF49715.2020.9221100.

Casual Study:

1. Dartel, Bram. "Malware detection in IoT devices using Machine Learning." Bachelor's thesis, University of Twente, 2021.