Week 12

- Week to do list
  - ☑ finish homework
  - ☑ read some papers

1. *This week the main work is to solve the code programming of EA.*
2. *Then I read two papers about hypernetworks, [1]*

[1] "Multi-Objective Security Hardening Optimisation for Dynamic Networks"

Problem: The main problem is to harden the dynamic network. In this progress, there are many multi-objectives constraints: fixed budget, availability of countermeasures, performance degradation, non-patchable vulnerabilities. Besides, the real situation is a dynamic networks but all existing approaches only considered the optimisation problems based on static network configuration and settings.

Main idea: Firstly, the authors use T-HARM to assess the security of dynamic networks.Secondly, they use NSGA-II algorithm to solve the multiple objectives and constraints. Finally, they evaluate their method on dynamic network scenario with patchable and non-patchable vulnerabilities.

Method: The core problem is from this paper [2]. Another related paper used NSGA is [3]. They assume a dynamic network where the components can change over time and a attacker to compromise the database server. The most important part is the T-HARM, which is used to assess the security of dynamic networks.

Related Knowledge: NSGA, modern networked systems (Cloud and Software-defined networking)

References

[1] M. Ge K. M. Khan S. Y. Enoch, J. B. Hong and D. S. Kim. Multi-objective security hardening optimisation for dynamic networks. *IEEE International Conference on Communications*, 2019.

[2] Simon Enoch Yusuf, Mengmeng Ge, Jin B Hong, Huy Kang Kim, Paul Kim, and Dong Seong Kim. Security modelling and analysis of dynamic enterprise networks. In *2016 IEEE International Conference on Computer and Information Technology (CIT)*, pages 249–256. IEEE, 2016.

[3] Rinku Dewri, Indrajit Ray, Nayot Poolsappasit, and Darrell Whitley. Optimal security hardening on attack tree models of networks: a cost-benefit analysis. *International Journal of Information Security*, 11(3):167–188, 2012.