
Project

Active Network Management (ANM) : Searching High-Quality Policies to Control an Complex Power Network.

DESCRIPTION

In this project, you are asked to implement a Smart Active Network manager. The network is illustrated in Figure 1. This network is equipped with three kind of devices (i) generators that are able to produce electricity (ii) load devices that consume electricity (iii) storage units that can both inject and withdraw electricity in the network. Your main goal is to maintain the network working. The full environment can be retrieved from this *source code*.

INSTRUCTIONS

You need to deliver (i) your cleaned and well documented source code used for this project and (ii) a report which is outlined accordingly of the project description. Your report also need to explain possible improvements of your approach. Please note that both the source code and the report are mandatory, and that you need to implement the relevant reinforcement learning algorithms *yourself*.

1 DOMAIN (8 POINTS)

Provide a formalization of the ANM6-Easy environment (except the dynamics) accordingly to this paper [1] and this *source code*. You should respect the formalization format used in the previous assignments. Provide the exhaustive list of characteristics of the domain as seen in the lectures.

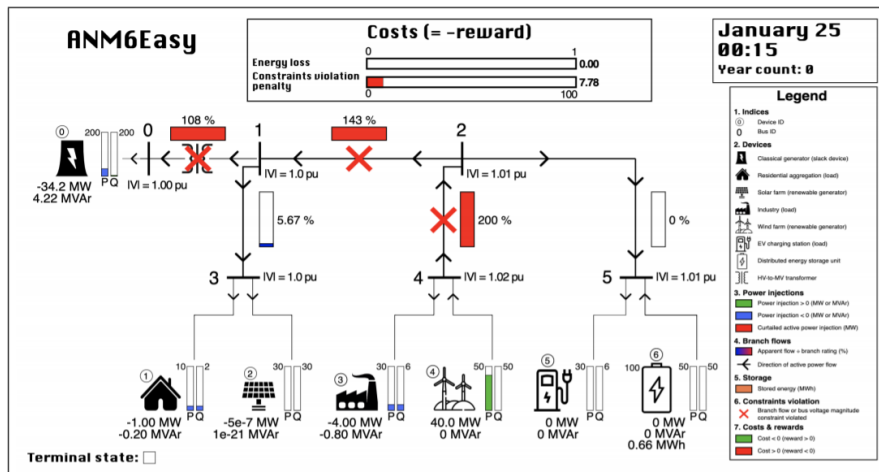


Figure 1: ANM6-Easy network

2 POLICY SEARCH TECHNIQUES (12 POINTS)

Implement :

- A policy gradient algorithm (such as REINFORCE) and
- An actor critic Method (such as Soft Actor Critic (SAC) or Proximal Policy Optimization (PPO)).

Design an experimental protocol to compare the performance of the continuous policies learnt by the two algorithms in the case of ANM6-Easy. Plot the performance of the algorithms at the end of each episode in a curve in your report. Based on the differences between these algorithms and the theoretical knowledge exposed through the lectures, discuss the results obtained.

REFERENCES

- [1] Robin Henry and Damien Ernst. gym-anm: a class of open-source environments for reinforcement learning research in active network management of electrical distribution systems. 2021.