Assignment #1: Simulated Annealing and Sampling

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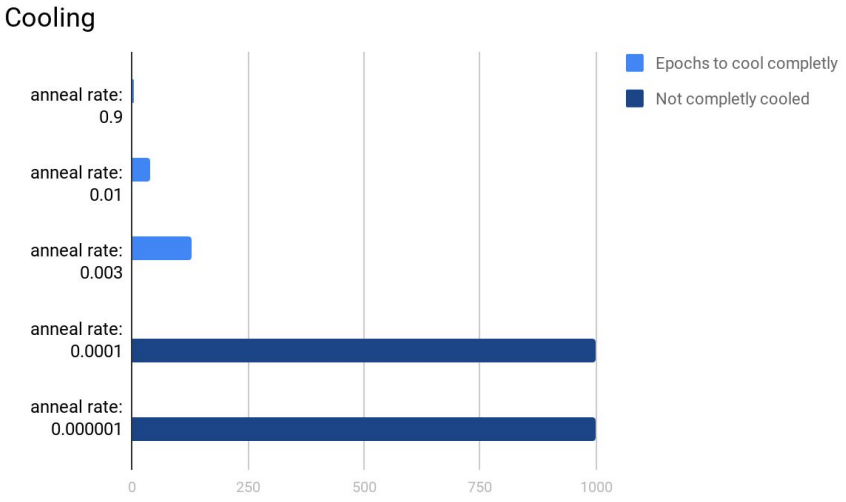
github: https://github.com/nekitboy/simulated_annealing_torch

To run code you need jupyter notebook or colab. (To not insure python modules to install better to use colab)

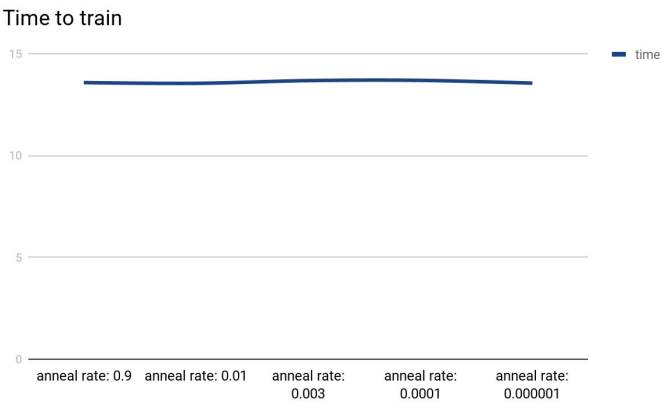
Task 1. Iris dataset (Task1.ipynb)

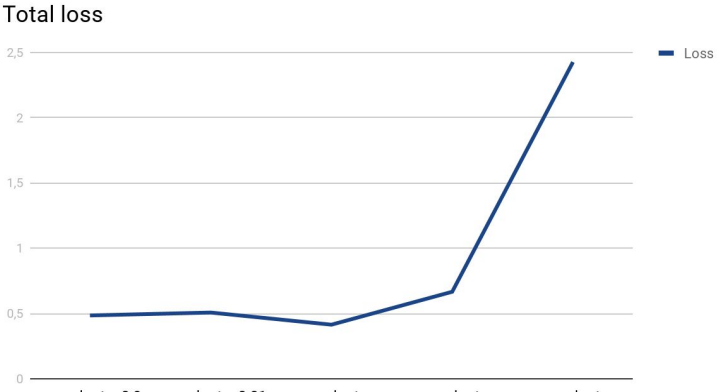
Annealing rate effects on how fast our temperature would decrease. In other words it is mean that how long we would try to explore global optimums, because temperature is used in acceptance random point probability. Low temperature tends to low acceptance probability.

I use annealing rates: **[0.9, 0.01, 0.003, 0.0001, 0.000001]** (from high, to low)
First I want to mention colling speed. I use batch size of **1000** and obtained minimum temperature on different epochs, showed on table below.



I measure also time, final loss and obtain next results



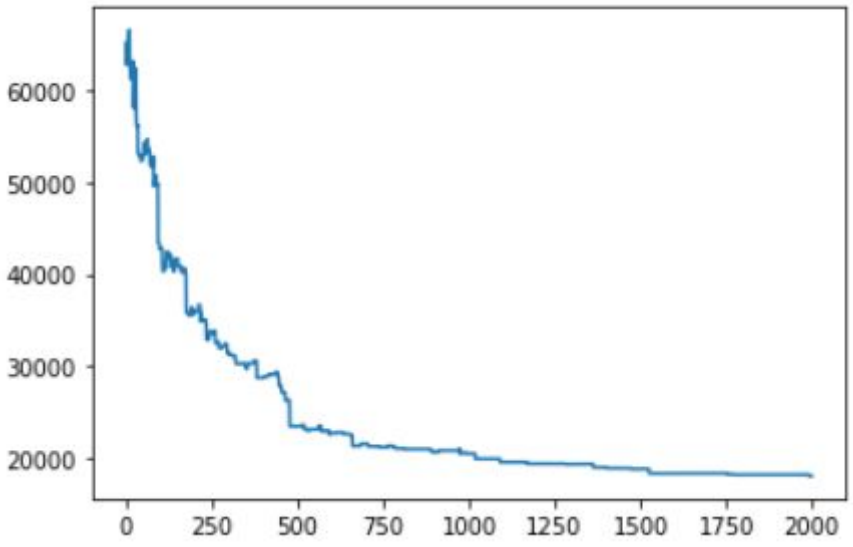


Results shows that processing time independent on annealing rate (in my implementation). Loss result is more interesting. With huge anneal rate as expected model converges to their local optimum. With optimal annealing rate model increases their results, meaning that model finds more global optimum. Small value of annealing rate tends to model could't converges and often make random shifts.

Task 2. Combinatorial optimization (Task2.ipynb)

For this task we need more to explore, because we don't have NN like in previous. So, parameters should support low cooling. When system cooled fast it mostly stucks in around **30000** energy.

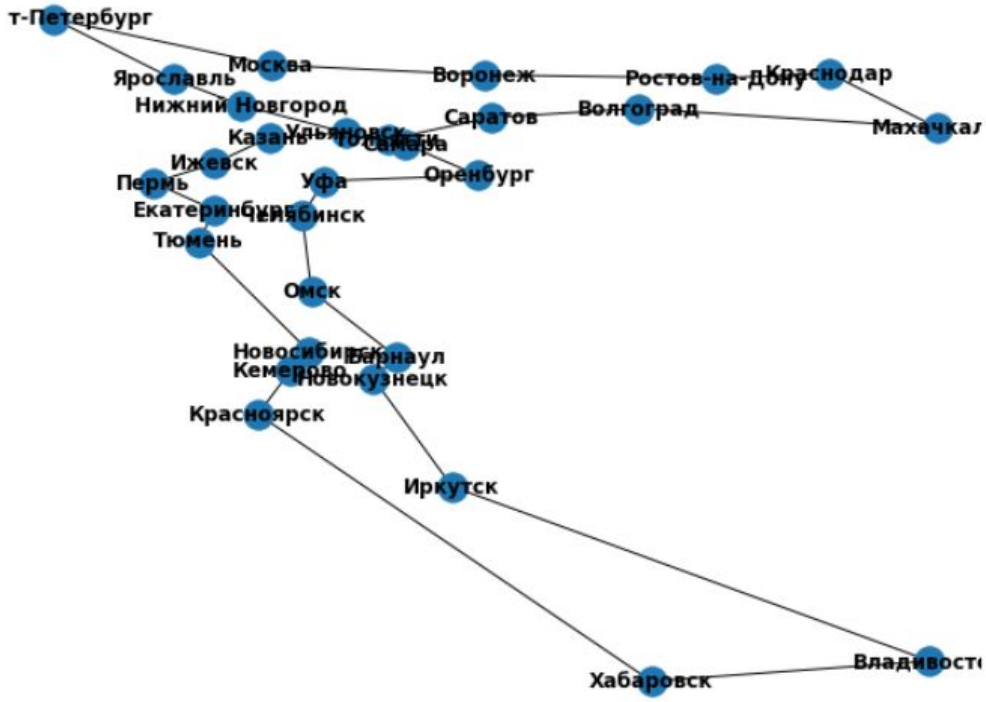
Optimizations steps is shown on plot below, where initial system energy is about **70000**, and finaly decreased to **17976.** By this plot is show that system was allowed to be worth (i.e. annealing) and finaly achieved good results.



Y-axis: energy

X-axis: iteration

Final cities graph could be visualized as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