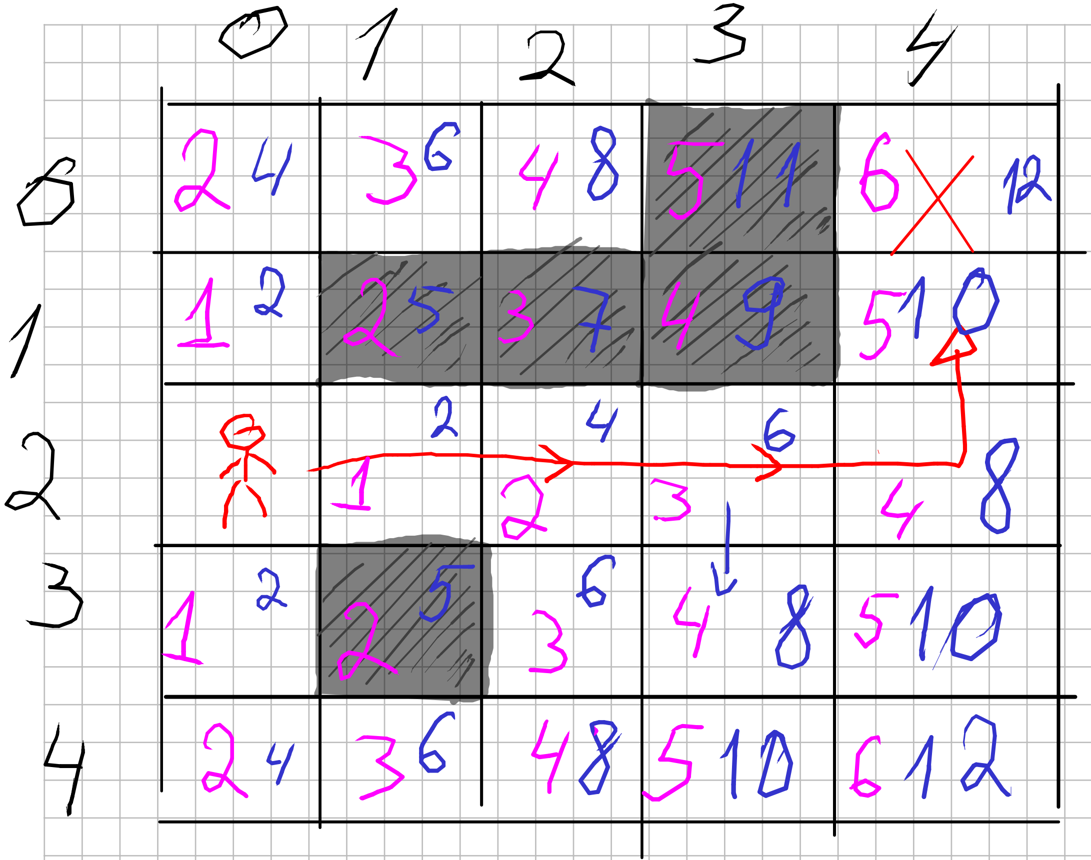
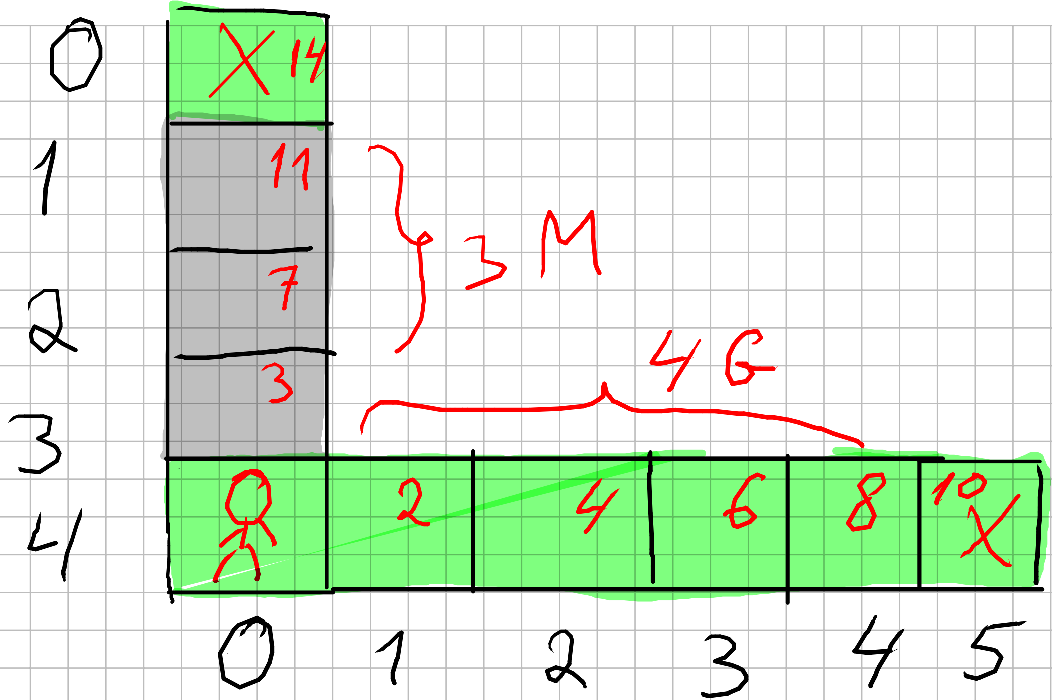
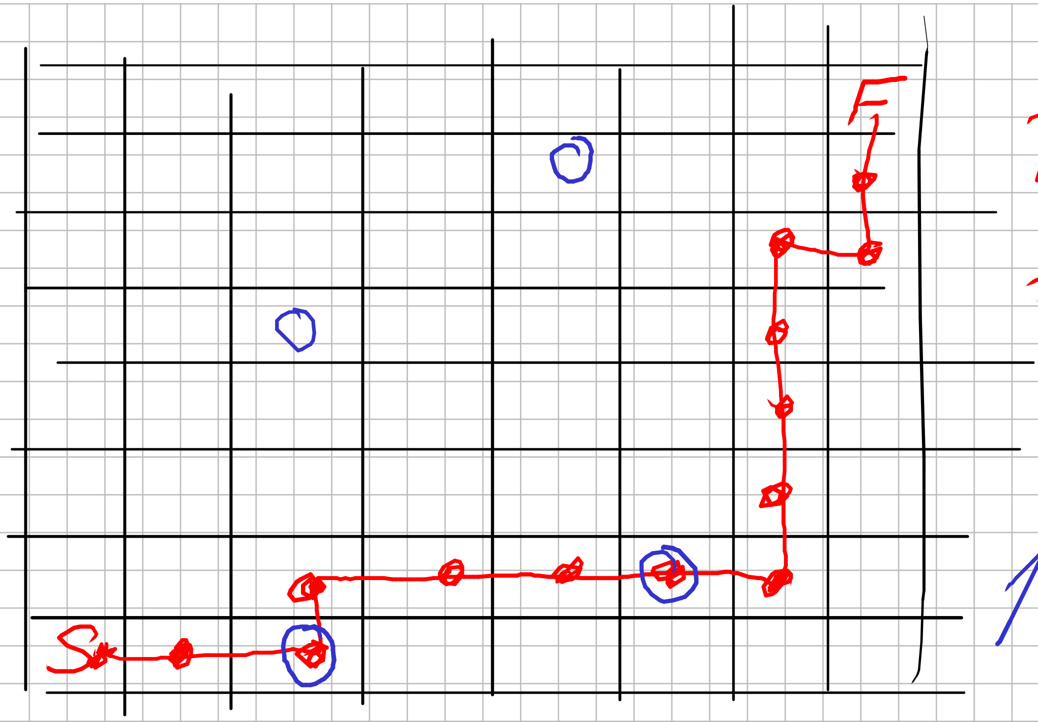


G - G = 2

G - M = 3

M - M = 4


0
1
2
3
4
14
11
7
3
3M
4G
2
4
6
8
10
0
1
2
3
4
5



Total cost $=$

$= \sum \delta(i, i+1) =$

$= \sum$ ter. cost

$14 \cdot 2 = 28$

$\delta(i, i+1)$ = terrain_cost from i to $i+1$

$$terrain\_cost + a \cdot r + b \cdot noise$$

$$\underbrace{\left[\sum_{trajectory} a \cdot r \right]}$$

$$r = \begin{cases} 0 & \text{if } node \notin G \\ 1 & \text{if } node \in G \end{cases}$$

общий вклад

комп. ar на траектории

$$\sum_{\text{trajectory}} a \cdot r = a \cdot \sum_{\text{traj.}} r = \star$$

There are $|G|$ goals on the map in total

Any trajectory w/o loops visits no more than all Goals.

$$0 \leq \star \leq a \cdot |G|$$

Even if I can't compute (*) in advance because I don't know what trajectory we end up with, I can still assess lower and upper boundaries for the value.

terrain_cost + a *r + b * noise

for each transition

Total Cost + Total Reward + Total Noise

for the whole trajectory

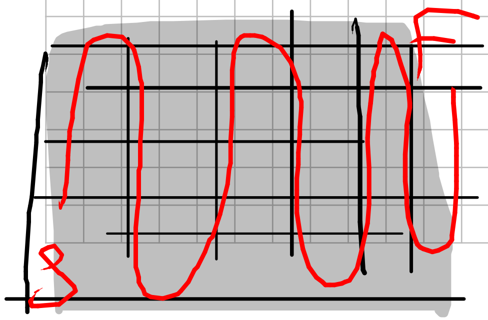
$$0 \le \text{Total Cost} = \sum_{\text{trajectory}} \text{terrain cost} =$$

$$= tc(0,1) + tc(1,2) + \dots + tc(n-1, n)$$

$n = |\text{traj.}|$

number of transitions

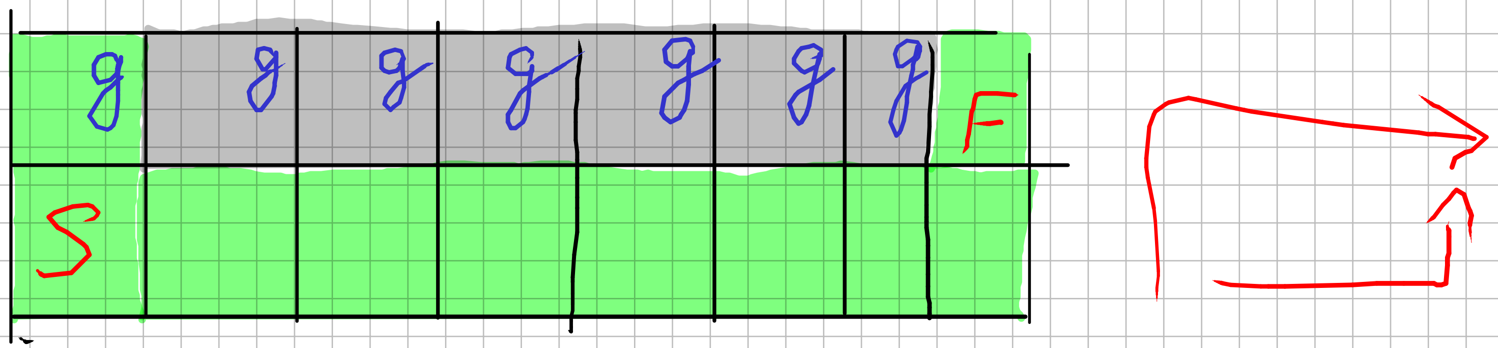
$$\le \text{Max}[\text{terrain\_cost}] \cdot \text{Max}[\text{trajectory length}] =$$



$$= 4 \cdot |\text{Map}|$$

even though the formula is Total Cost + Total Reward + Total Noise, we mainly optimize the Total Cost component (because we are looking for the shortest path).
e.g. suppose we have two trajectories A and B.
Total Cost for A is 82
Total Cost for B is 83 $\Delta = 1$

A doesn't visit any goals, but B visits every single goal.
Regardless, we choose A over B because A is shorter.



Total Cost is a descrete value with a step of "1".

So how do we choose formula for Total Reward so that it doesn't mess up priority over Total Cost.

$$V_1 = 82 + \theta$$

$$V_2 = 83 - a \cdot |G|$$

$$V_1 < V_2$$

$$82 + \theta < 83 - a \cdot |G|$$

$$a \cdot |G| < 1$$

$$a < \frac{1}{|G|}$$

$$a = \frac{1}{2|G|}$$

$$a = \frac{1}{|G| + 1}$$