Progress Report

EECS 472

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Agent Behavior

Like it is said in project proposal, there are three characters: worker(also called gold-digger), bad guys(cowboy) and police (also called sheriff). All agents with 100 dollars initially. The rules are:

If I am a gold-digger

--If I have money to detect and dig, I detect whether there is treasure underground.  
--If I find there is treasure, I dig it out to become richer, then I move to other place if I have money to travel

If I am a cowboy

--I first grab money from gold-digger if there is any here, after grabbing money I have a chance to kill the gold digger then move to another place if I have money to travel

If I am a sheriff:

--I first punish cowboy by taking away all his money if there is any here, then I have a chance to kill the cowboy. Then I move to another place if I have money to travel.

System Behavior

When setup, the system initial certain amount of each agents. Also, it initial the patches to represent recourse underground. If a patch is brown, it means there is gold underground, if it is black, it means there is no treasure.

At each tick, all agents move according to the rules above and the ground update color to tell user the condition of treasures.

The system stop in three conditions:

1. No treasure is underground.

2. All gold diggers have no money

3. There is no cowboy.

Rationale for agent rules

In any society individuals can be roughly divided into three groups, the one who really produces wealth and not against government, the one who take advantages of others effort or even damage the society on purpose, the one who maintains peace, support the working of first group and punish second group. Moreover, in different conditions, each character has chance to change to another one. So my rules aim at simulate each character's behavior and the condition how character can switch roles. At this stage, only simples rules to simulate real naive situation.

Model output

Generally speaking the model can give me the result I expected. Specifically: the more gold is underground, the more wealth will be dig out; the harder the digger can dig gold(e.g. more expensive detect and dig fee), the more digger in the system the richer the whole society will become,; the less money they will get; the more cowboy or the more their chance to kill digger, the more wealth they will hold; the more sheriff or their chance to kill cowboy, the less wealth cowboy can grab.

These results are very straight forward simulations of real world and makes sense intuitively. However, the exact relationship is unknown yet. Like whether the factors have linear relationship or exponential, this will be discovered in later stages with more specific measures.

Questions

Here will discuss some limitations and concerns about my model.

I haven't defined a very precise measurement of what is a "stable society" and what is a "productive society". Currently the measurement for stability is the amount of cowboy doesn't increase. As for productivity it is the amount of wealth in digger and sheriff doesn't decrease.

Maybe one agent do only one thing is too simple, consider human's complexity. If next iterations turn out can hardly simulate real society, I will consider add some more rules for breed.

Next steps

Next iterations I will implement two things:

Firstly I plan to define three types of recourses: permanent recourses which can always produce wealth(like sunshine, wind in real world), renewable recourses which can be run out if use speed is greater than grow speed(like grass in real world) and non-renewable recourses which can never grow again(like oil in real world).

Secondly I plan to define rules for agents switching characters. If one agent have all neighbors as another kind agent, it will become that kind. If worker run out of money, it will becomes cowboy.

These are the main tasks for next one or two weeks. I will see how far I can goes within next two weeks and decide what to expand then.

Side note: Currently my names for each character is not good enough, I will rename them later.