A3 – Social Forces

1. Group Github address and Youtube links:

Github: <https://github.com/liuchengtian/CS523>

Pursue and Evade: https://youtu.be/LZDIey6laws

Leader Following: https://youtu.be/sKjOb3C2dJc

Growing Spiral: <https://youtu.be/kFw0m9GCU_Y>

1. SteerBench Scores:
2. Pursue and Evade:

total number of agents: 20

avg. number of collisions per agent: 0

average time spent by one agent: 35.3497

average energy spent by one agent: 0

sum of instantaneous accelerations: 0

(alpha, beta, gamma, delta) weights: (50,1,1,1)

weighted sum: 50\*0 + 1\*35.3497 + 1\*0 + 1\*0 = 35.3497

final score: 35.3497

1. Leader Following:

total number of agents: 13

avg. number of collisions per agent: 2.76923

average time spent by one agent: 45.6994

average energy spent by one agent: 0

sum of instantaneous accelerations: 0

(alpha, beta, gamma, delta) weights: (50,1,1,1)

weighted sum: 50\*2.76923 + 1\*45.6994 + 1\*0 + 1\*0 = 184.161

final score: 184.161

1. Growing Spiral:

total number of agents: 4

avg. number of collisions per agent: 0

average time spent by one agent: 53.1993

average energy spent by one agent: 0

sum of instantaneous accelerations: 0

(alpha, beta, gamma, delta) weights: (50,1,1,1)

weighted sum: 50\*0 + 1\*53.1993 + 1\*0 + 1\*0 = 53.1993

final score: 53.1993

1. Implementation

When the agent is build, we use “state” to clarify what scenario we choose.

In SocialForcesAgent::updateAI(), pursueEvade(dt) and leaderFollow(dt) are used to calculate the social force.

1. Pursue and Evade:

In Pursue and Evade, green agents are pursue agents, and red agents are evade agents.

Util::Vector SocialForcesAgent::pursueEvade(float dt) calculates result for pursue type agents and evade type agents.

The the evade agent needs a force to push it away from the pursue agents, so we use result -= agent->position() + agent->velocity() \* dt - position(), so that the agent will away from the pursue agents.

The pursue agent need a force to pull it to the position, so we use result += agent->position() + agent->velocity() \* dt - position().

1. Leader Following:

In Leader Following, the leader acts the same as the default agents. The followers are almost the same as pursue agents, but a separation is added only for following agents (not other agents), so that followers won’t crash into the leader and other following agents.

1. Growing Spiral:

In growing spiral, result is a centripetal force.

