Monday, April 24, 2023
Lecture #38
MSSC 6000

Announcements

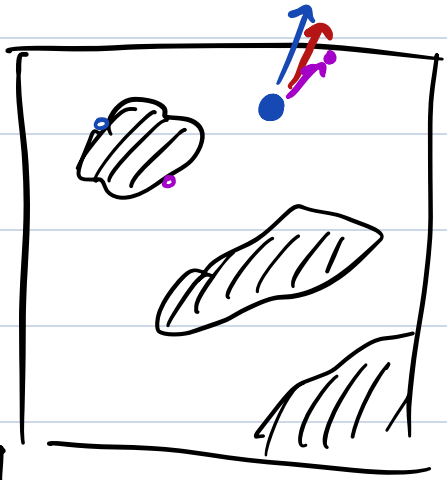
* Homework 5 due tonight, 11:59pm
* Homework 6 assigned today, due the last day of class, 11:59pm
* Final Exam (take-home) assigned last day of class, due ≈ Friday, May 13, 11:59pm
* Course Evaluations are open
* Normal OH this week

Topic 13 – Particle Swarm Optimization (PSO) (continued)

* Demos

Problem: What if your particles run away?

* We need a way to keep our particles in regions that satisfy our constraints.
  → Could be nice bounds like $-2\pi \leq x, y \leq 2\pi$
  → Could also be more complicated like the spring problem
* What to do when a particle wants to move into a bad area.



Option 1) If a particle wants to move to a bad area, just don't move. (The particle keeps its position.) Could be better next generation because the inertia is decaying ($\alpha < 1$).

Option 2) Destroy the particle and create a new random one.

One way to limit particles flying out of bounds is to set a max speed and slow down

any particle that exceeds it. (see code demos)

* Sometimes its helpful to add another term to velocity in between local best and global best. For each particle, pick a few (3-10) other particles to be its "informants".
  Add a term

$$r_3 \cdot \delta \cdot (\text{[best sol any informant has seen]} - \text{current position}).$$

* PSO has no hill-climbing component.
  How could we incorporate some H-C into PSO?
  * Stop PSO at some point and make every particle H-C.
  * Alternate back and forth.