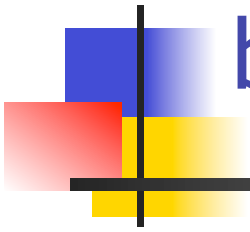


So you want to animate a flock of
boids





Assignment #5b

- Which is something that you may wish to do since it is assignment #5b.



Assignment #5b

- Then again....maybe not
 - Must do 1 of the 2
 - Behavioral Motion
 - Particle Systems



Assignment #5b

- Goal:
 - To animate a group of boids



Assignment #4b

- Program may be:
 - Interactive – show the animation in window on the screen
 - Batch – create an app that will produce a set of input files for a renderer.

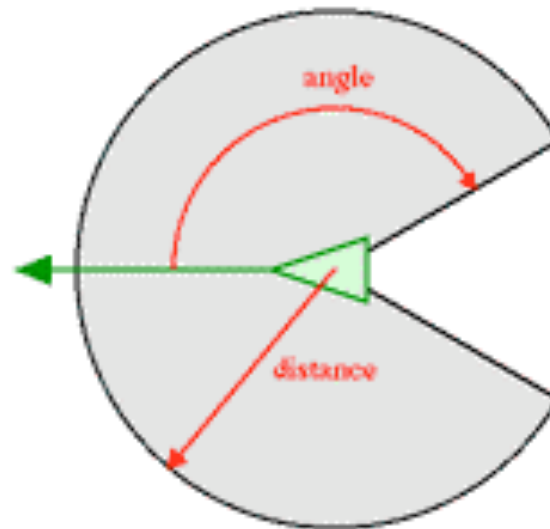


Assignment #4b

- In either case, program allow for the following set of parameters :
 - nboids = number of boids in flock
 - collision = weighting for collision avoidance
 - velocitym = weighting for velocity matching
 - centering = weighting for centering
 - follow = weighting for leader following
 - range = neighborhood range of boid
 - leader = path of leader

Sensor range

- Commandline arg will give distance of neighborhood
 - Angle = 360 degrees



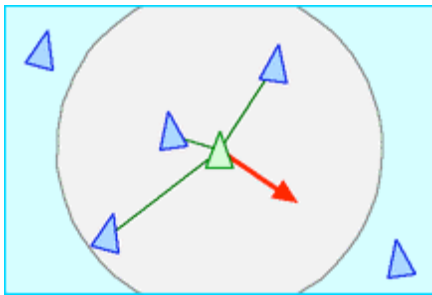


Sensor range

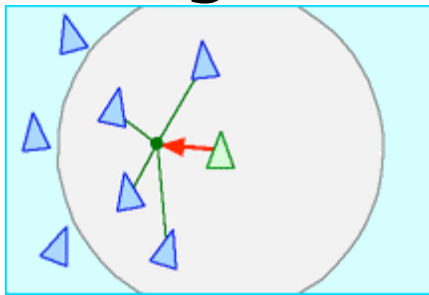
- $O(n^2)$ problem.
 - Even though motion is determined only from boids in neighborhood
 - Must determine at each time step, who is your neighbor.
 - Compare $(\text{distance})^2$ rather than distance
 - Avoid the square root

Determining Motion

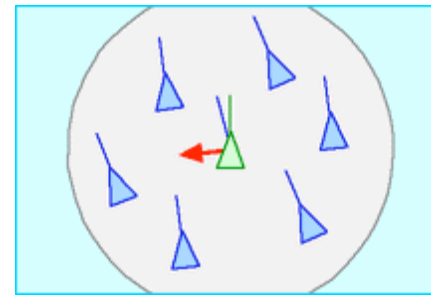
- Recall that there are 4 competing forces in determining motion:



Collision
avoidance



Flock centering



Velocity
matching

Following



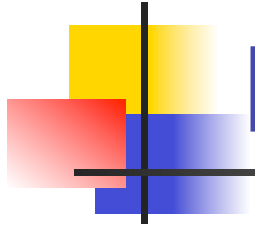
Determining Motion

- Parameter arguments will determine weights to be given in calculation of final motion.
 - Note that direction/velocity of motion gets calculated at each time step.
 - Collision avoidance – move away from your neighbors
 - Flock centering – move toward the centroid of your neighbors
 - Velocity matching – set velocity to average velocity of your neighbors
 - Following – move towards the global leader (velocity should be no greater than range of neighborhood)
 - Normalize weights so that all add up to 1



Determining Motion

- The trick with flocking is coming up with decent weights.
 - Experimentation needed
 - Indicate good set of weights with submission.
 - Interactive weight modification for realtime apps (as an extra)



Boid model

- Use a simple shape to represent a boid
 - Sphere
 - Cube
 - Possible extra? Stay tuned!



Following the leader

- Leader path will be given as keyframes
 - Leader boid motion will be determined by keyframes alone.
 - Format:
 - $t \ x \ y \ z$
 - 1 line per keyframe
 - Make last key position equal to first (loop)
 - Use format from assignment 1
 - Use interpolation routines from assignment 1



Following the leader

- Continuous loop of leader
 - For batch animations, must indicate number of leader loops to animate



Bells and Whistles

- 20 points
 - Basic flocking
- Extras (5 points each)
 - Interactive weight modification (for realtime)
 - Use cone as boid model pointing in direction of motion
 - Must rotate boid



Due dates

- Due
 - Friday, February 18th
- Submission
 - Mycourses dropbox
 - Please include documentation on
 - how to run your app
 - How to build your app
 - Sample input file
 - Renderer used if batch
 - Indicate Platform on dropbox description



Questions?

- Next time:
 - Character Animation / Levels of Detail
 - Questions?