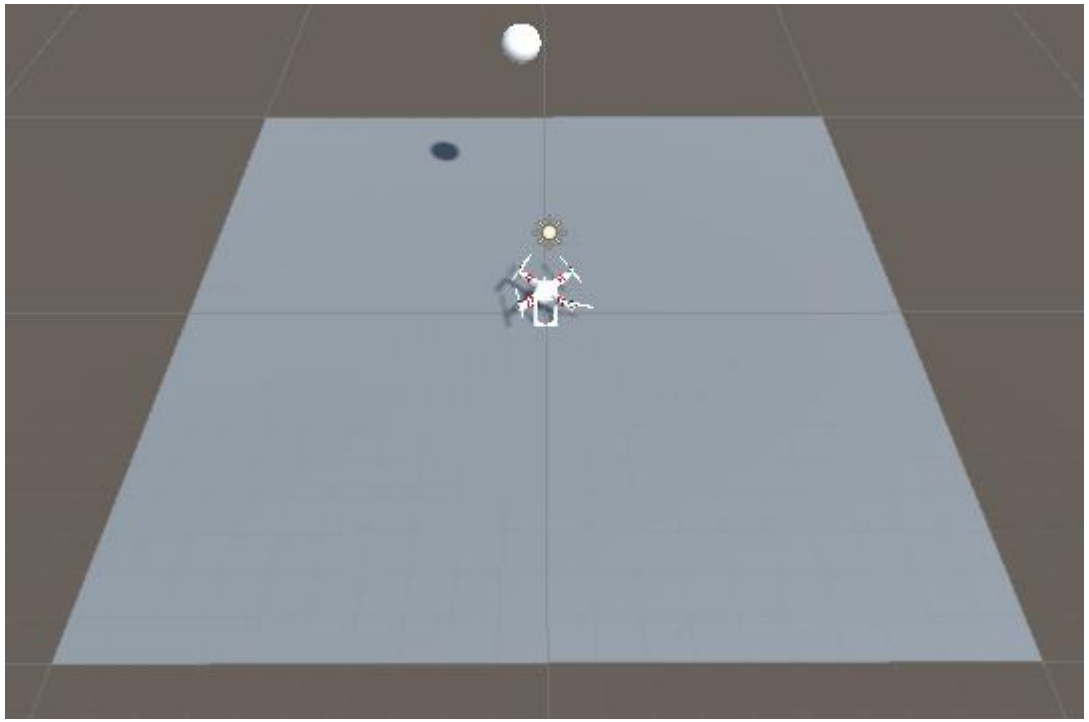
ml-agent를 활용한 드론 제어

2019305050 이제희

Unity 환경



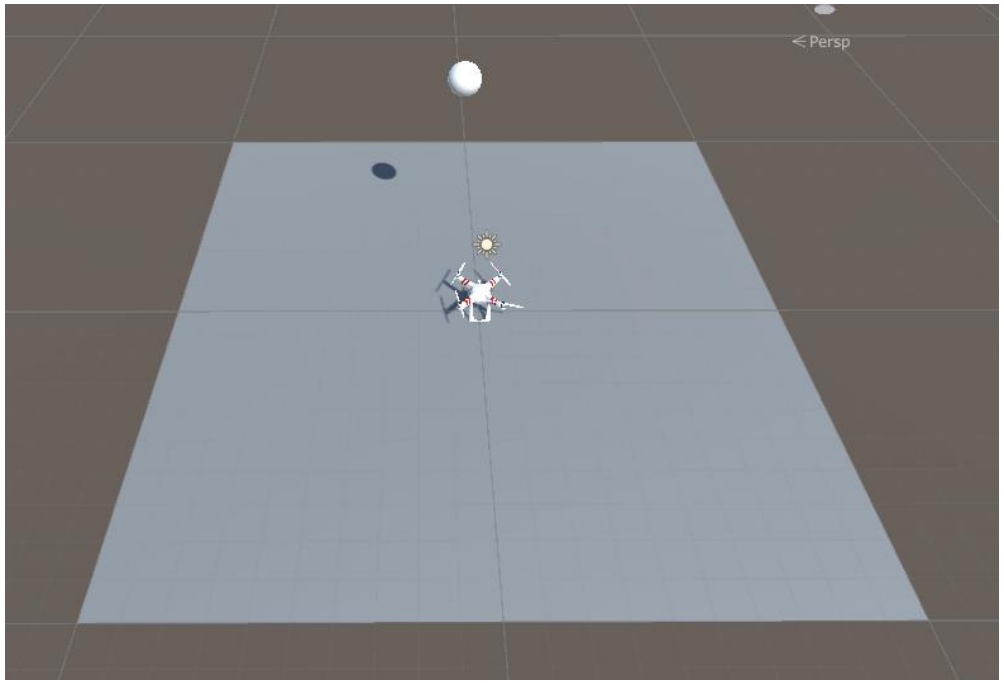
각 드론 날개에 y축 방향으로 힘을 주는 것을 학습
-> 연속적(0~1)

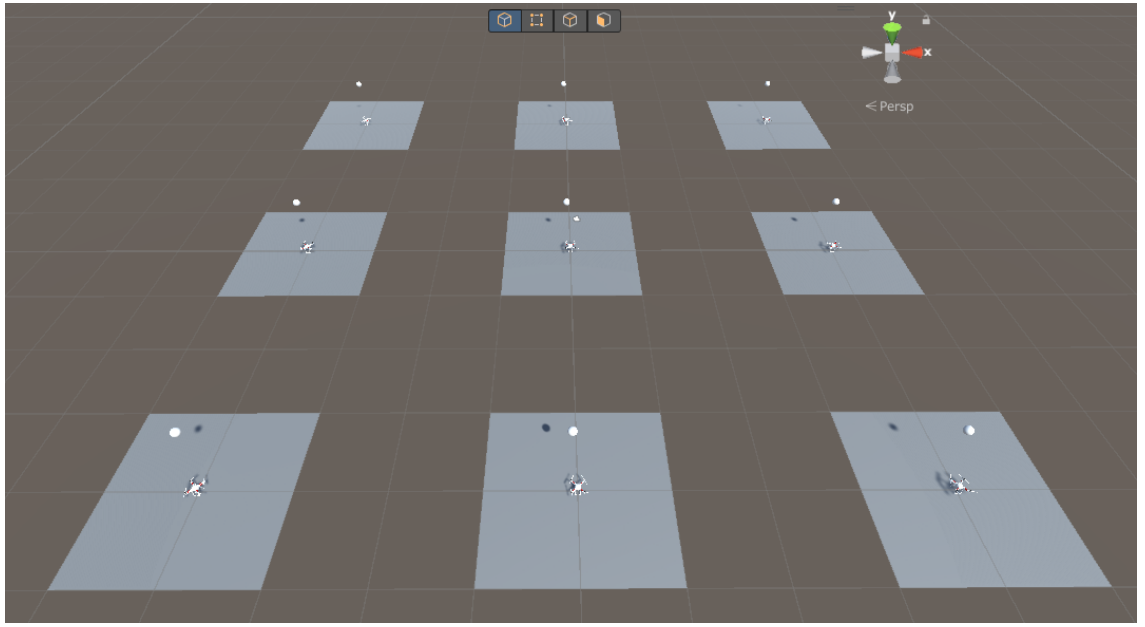
Target 생성(위치 고정)

- Reward -
Step마다 - 0.1

(X, Z rotation<10) && (X, Z rotation>350)
-> +0.1*(10-distance)

Unity 환경

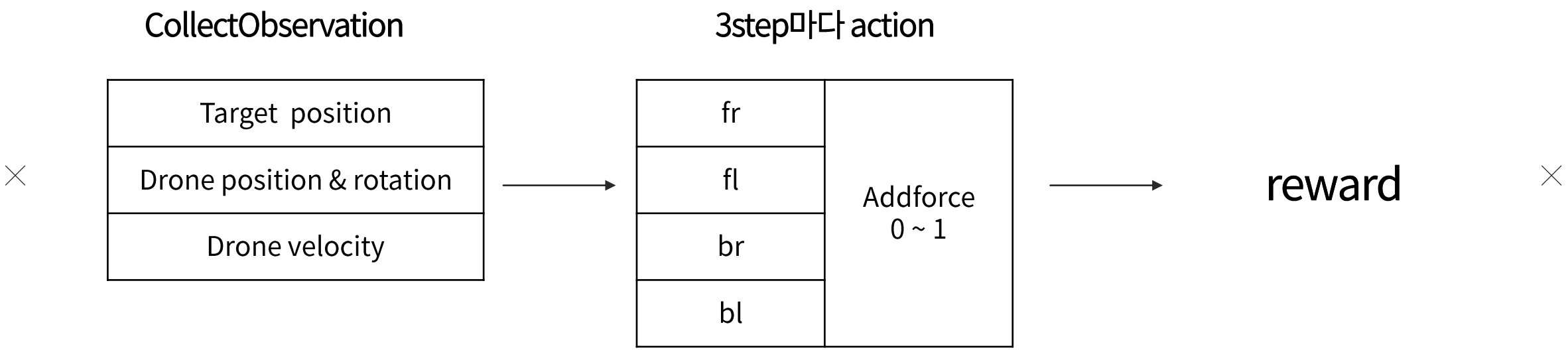




모델 상태

state		value
Target location	x	-5 ~ 5
	y	9
	z	-5 ~ 5
Drone location	x	0
	y	0
	z	0
Drone rotation	roll	0 ~ 360
	pitch	0 ~ 360
	yaw	0 ~ 360
Drone Velocity (m/s)	fr	0 ~ 6
	fl	0 ~ 6
	br	0 ~ 6
	bl	0 ~ 6

모델 입력


CollectObservation
Target position
Drone position & rotation
Drone velocity
3step마다 action
fr
fl
br
bl
Addforce
0 ~ 1
reward

Reward

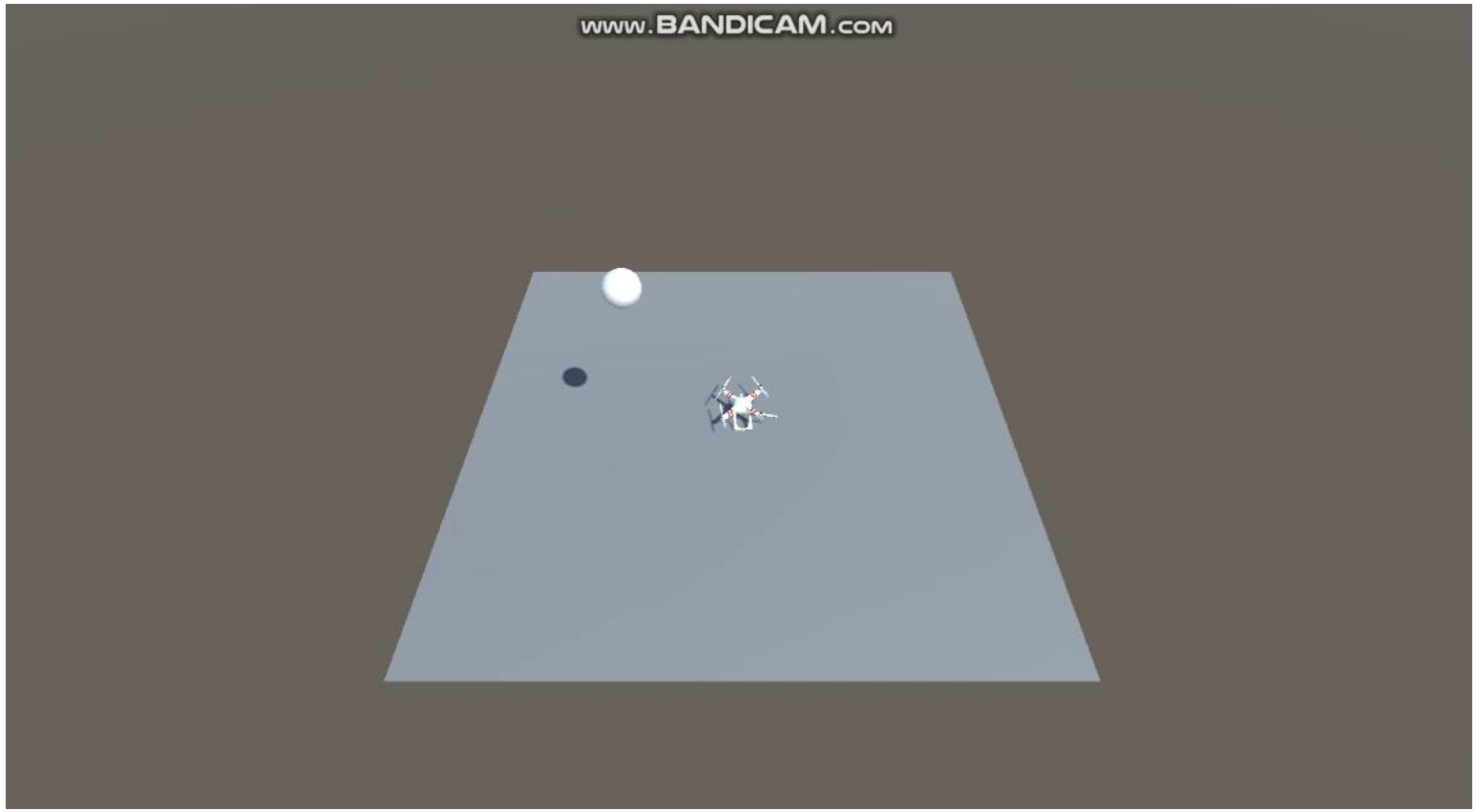
GP = Gaussian(pitch , 0 , 10)*25
GR = Gaussian(roll , 0 , 10)*25
GD = Gaussian(distance , 0 , 8)*25

Reward = GP + GR + (1.5*GD)

if

Pitch & roll -> 90° 이하 Reward = -1000 에피소드 종료	Drone location x, z -> 10이상 Reward = -1000 에피소드 종료	Step수 > 5000 이상 Reward -= 1000 에피소드 종료

결과 영상



결과 그래프


Cumulative Reward
tag: Environment/Cumulative Reward
800
400
0
-400
-800
0
1M
2M
3M
4M
5M