Notes on Duff Ball Machine Learning

For collaborative Training use **'poca'** **and Group Rewards** signals that are assigned by a central game Manager. The Game Manager has to Register all its ML Agents into Groups, to which it assigns the Group rewards.

The Unity Curriculum Learning process can only work of basic "reward" or "progress" measure thresholds. Rather than a Group Reward Signal. Where the "progress" measure, is a scheduled change according to fraction of the overall Training Max Steps updates.

Run 3

Used a Unity Curriculum Game level management, but with a scheduled "progress" at specific Training Steps. So Game progression is scheduled and is NOT a function of any reward performance.

The Training managed to train some reasonable performance on the lower levels to around Level 8, averaging a Positive group Reward. However the advancement beyond level 9 (or 10) at 15 Million Steps, could not recover the training Group Reward Performance.

oup Cumulative Reward
ɔ: Environment/Group Cumulative Reward
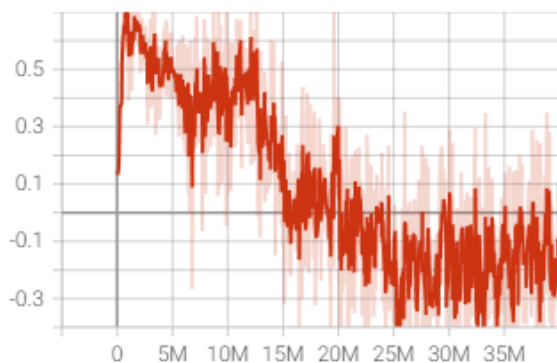
Lesson Number/Gamelevel
tag: Environment/Lesson Number/Gamelevel
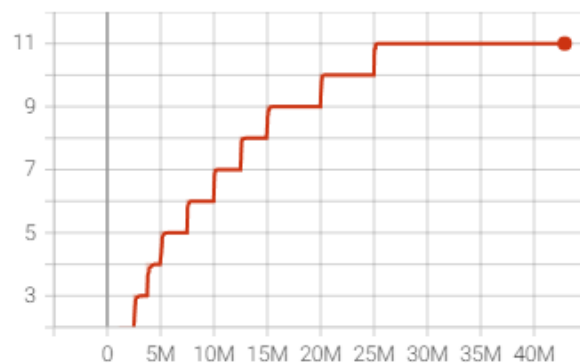
The Player performance was reasonable, in that the Red Player, even at Level 12, was not totally swamping the Blue player performance. The Typical Score lines being around Red:1200, Blue:800 at the most advanced level.

Run 4:

Introduce An Explicit Curriculum Game level management Update:

Use a Game level Update => if(Blue Score > 50) && (Blue Score/Red Score)> 1.25 => Advance the Game Level.

Reaches Game Level 10 in 4 Million Steps. And gets to level 12 within 7 Million Steps. Although the Group Reward Average is then somewhat neutral (bounces around Zero).

Game Environment 6 got up to Level 14 since the Red Team Unable to Score !

See the Captured Video **DuffBallRun4**

The Trained Blue Player tactics seems to be simply to be to Chase and Get the Ball and then to DribbleForward towards making a Strike, without making ANY Pass decisions. This may be because, the Probability of a successful Pass is quite low. So there is no Blue passing of the Ball. Probably because the probability of a successful pass is quite low.

Run 5:

Make probability of a Successful Ball Tackle a little Higher:

- TheBallControl RequestBallTackle(): Change the probability of a successful Tackle from RandomChance > 60, to > 55.
- And TheBallControl RequestBallTackle(): Reduce Tackle CountDown from 50 to 45
- Re Copy: Game Environment 6 :
- Make 12 the Maximum Game level

Similar to previous Run – gets up to League 11 in 7 Million Training Steps

Note: Blue Players still never use the pass Ball Action and hardly Dribble forward, Mostly Dribble Wide

Noted that: Goal Keepers hardly ever does any Save or Miss Animations *? - Maybe because the Ray Intercept from the Player does not hit the Goalie Collider as often, or hits the character controller, not Intercept. => Need to make the Goalie Box Collider Bigger, in front to Goallie. But then should do a Miss at least – Or simply Too slow to get into those animations states.*

Run 6:

Try to get Goal keeper Save/ Miss Animations to Work

- Goalkeeper Box Colliders Slightly (to front)
- Quicker/ Immediate Transition from GoalKeeping => Miss/ Save Animation states
- Player/ ML Player: To Perform Strike at 0.2f through the Strike Animation.
- Need Review to get GoalKeeper Animations and States to Work
- *Use IF(Goalkeeper State == Missing || Save) To Avoid Going into Goal Keeping if currently in those states, within Main Processing Update Checks.*

And further improve the Tackle Takeover Probability

- TheBallControl RequestBallTackle(): Increase the probability of a successful Tackle from RandomChance > 60, to > 50.
- And TheBallControl RequestBallTackle(): Reduce Tackle CountDown from 50 to 40
- Reduce Max Steps Down to 10 Million – As Seem to typically get to level 12 by then

Suspect will not change the Pursue Ball/Player, Dribble and Strike Tactic (No Passing)

Note Watching tensorboard makes little sense, without Unity ML curriculum configuration, and an erratic group Reward signal.

Pretty Good – Most Environments gets to Level 12 But then struggle to compete with the similar performant Red Side. Still little to no passing.

Capture Video Run 6 Playing at level 11, And the Initial (Dumb) Brain at level 1, where can observe Blue being a rather Random, but a pass is actually executed.