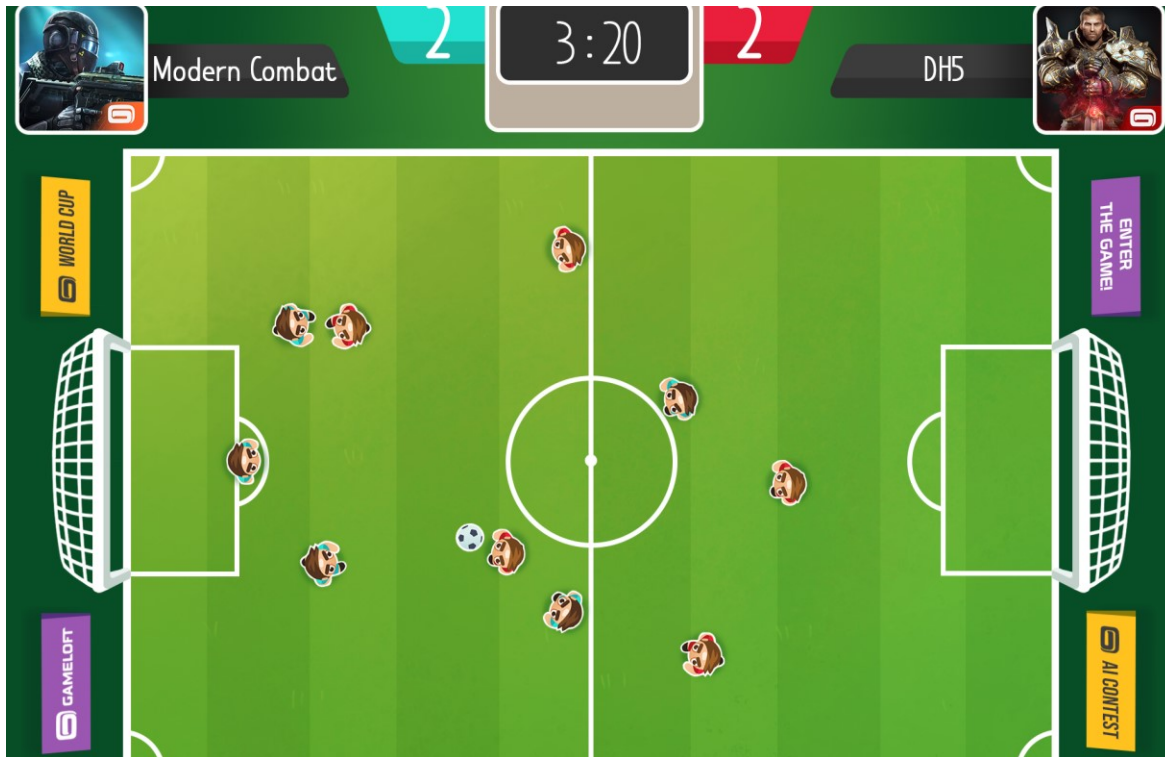


Code To The Goal

DAD AI contest 2018
v1.0.1



I. Overview

- The AI splits 10 Players into 2 teams, each team will try to put the ball the other's net within the time given (currently 5 minutes).
- The team has more goals will be winner.
- No throw-ins or corner kicks. Ball bounces back into the field when colliding with the border.
- No Goalkeeper.
- GOLDEN GOAL (sudden death) is applied if the match is a draw, then RANDOM or PEN if not extra time runs out.

II. Game Rules

1. Player

- A player can perform 2 actions: (1) Hit the Ball to any point on the field, (2) Run at a fixed velocity; no acceleration and/or deceleration
- A player can kick the Ball to any target point with the necessary strength.
- If a player decides not to kick the ball, the ball will pass through him.
- A player cannot move out of the field.
- 2 players cannot collide and must be able to go through each other.

2. Ball

- The ball has highest speed immediately after leaving a player and gradually decelerate thereafter.
- Ball bounces back into the field when colliding with the border.
- When Player perform a shoot action, the ball will move with slightly off direction & power (0%-4% margin of error)

III. Control AI

The screen displays at **14400 x 9600** resolution (ratio : 1.5)

Each match has **1000** turns.

(Note: those values can be modified later to be best suitable)

When starting (turn 0):

AI send the team formation (the init position of each player) to Game Server, and for the case his team will start at left of field (team A). If AI skip this step, Game Server will init the default for team information. If his team will be team B or in second half, the Game Server will transform team information to be right of field ($x_{new} = map_width - x$, $y_{new} = map_height - y$)

The command has to follow the format

: **[Player1_posX][Player1_posY][Player2_posX][Player2_posY]...[Player5_posX][Player5_posY]**

At the first frame, server will send some init information to each AI, including : Team ID of AI, Map Width, Map Height, and Number of Turns, following the formation:

[TEAMID] [MAP_W] [MAP_H] [NUM_TURN]

(the value of MAP_W & MAP_H is 14400 x 9600)

In each turn of the game:

Server send to each AI the information of that turn, following the order : Current turn, the score of team A, the score of team B, match state (first match, second match, extra match), the position of ball, the speed of ball toward 2 direction X & Y, the player ID and player position of all players of 2 teams.

The format of this message:

[Turn] [m_scoreTeamA] [m_scoreTeamB] [stateMath] [ballPosX] [ballPosY] [ballSpeedX] [ballSpeedY]

[Player1_Team1] [Player1_Team1_posX] [Player1_Team1_posY] ... [Player1_Team2] [Player1_Team2_posX]

[Player1_Team2_posY]...[Player5_Team2] [Player5_Team2_posX] [Player5_Team2_posY]

The AI controls 5 Players of its team, and each player can perform: MOVE, SHOOT or just WAIT

- MOVE X Y F : a player can move 300 pixels maximum on the X and/or Y axis. If the distance from current position to (X, Y) is smaller than 300, the player will move to (X, Y). The F param will not count in this command (but keep in there to maintain the command format).
- MOVE = 1
- SHOOT X Y F : the Player performs shoot action, in which (X, Y) is the target coordinates and F is the power. The ball must be in control area of the player (distance from player to ball \leq 200 pixels)
- SHOOT = 2
- WAIT X Y F : the play will not move and also not shoot, just staying at current position
- WAIT = 0

Game Server will receive the message from AI following format: **[ACTION_1] X1 Y1 F1 [ACTION_2] X2 Y2 F2 ... [ACTION_n] Xn Yn Fn**, with ACTION_n is action for player[n]

IV. How the Game Server works

When starting:

The Server will ensure the init position for all players are created, so if AI doesn't send team information when match started, Server will arrange the players at default position.

Some information created by Game Server:

- Map Width & Map Height : 14400 x 9600 pixels
- Ball position : the center of field (W/2, H/2)
- The maximum pixels that player can move each turn : **300** pixels
- The maximum distance that the player can shoot : **200** pixels
- Ball speed decreased each turn : **120**. If Ball speed less than **120**, the ball will be stop.
- The ball speed will be calculate by equation : $V = F \cdot 10$ after the player perform SHOOT action with F power ($0 < F < 100$). If the player shoot when ball is moving, ball speed will be re-calculated by that equation.
- The value of ball position, player position, ball speed toward X,Y : integer number

In each turn of the game:

Game Server will execute based on the message that sent from 2 AIs for all players

Move command : MOVE X Y F

- The player will move to (X, Y) with speed = 300/turn
- If distance from player to (X, Y) less than 300, the player will be moved to (X, Y)
- If (X, Y) is out of the border, the player only can move to the border.
- Move command can only effective at the turn AI send to Server, not effective at later turns if player is not moved yet to (X, Y) or the player perform other action.

Shoot command : SHOOT X Y F

- The player will shoot the ball to (X, Y) position with power F (F is in range 0 - 100)
- If (X, Y) is current ball's position, server will select a random direction for ball.
- If player perform shoot action, server will check the distance from player to ball and just perform shoot if the distance ≤ 200 . If the distance > 200 , the shoot action will not effective and player will not move.
- In case there are many players perform the shoot action, the total shoot power will be sum of power vectors.
- The power value is always ≤ 100 . If sum of powers > 100 , the power will be 100.
- In order to ensure the distinctness for each match : the ball direction and ball power when player perform shoot action will be increased or decreased in a random range (from -4% to 4%). it means the player will hard to shoot exactly as he wants.

How the ball move

Each turn, the ball speed will be decreased 120. If the ball speed < 120 , the ball is stop.

The ball's position will be sent back to AI at each turn.

Ex: Below is an example of the ball's position is updated within 1 second (0.2s threshold):



The ball can be move through the player if ball is moved more than 200 between 2 turns.

Example for where the AI **can miss the ball** (the ball moves through the player):



Example for where the AI **can hit the ball**:



V. Game Stages

1. Kick Off phase

AI has to set up the Starting Formation.

- The AI can place its players anywhere on the field except for opponent's ground and the center circle.
- If the AI puts its player into opponent's ground or the center circle, the game will punish it by giving a default formation (or put the faulted Players to random positions on the field that fits the initial criteria).

With team A, the player nearest to the center circle will be picked to start the kick off. This player has permission to stand in the center circle and kick the ball after the KICK OFF signal is sent.

The game starts after the KICK OFF signal.

2. Playing phase

The total turns of 2 half is 1000 turns

After a team has scored, the other team will continue the game with the ball at the center circle (same rule as Kick Off phase).

"HALF TIME" signal is sent after 500 turns.

"FULL TIME" signal is sent after 1000 turns.

"EXTRA TIME" will be presented during 300 turns and apply GOLDEN GOAL rule. If a team score at this period, the game will be finished and winner is team has scored

"PENALTY SHOOTOUT" (or random) signal is sent after Extra Time.