Introduction

This is a quick rundown of the classes, functions, and other things that will be necessary to create the blocking assignments code.

Classes

The two main classes are the Player and Assignment classes.

Player

The Player class represents a player (either offensive or defensive) on the field. It has an x and y coordinate as well as the player's ID and an additional identifier to determine whether or not they are on offense.

Functions

- `distance_from_player`: Takes a reference from another Player object and returns the Euclidean distance between the two players.
- `potential_assignments`: Given a list of all defenders on a play, returns an ordered subset of which the player could potentially block in that frame by distance from the defender. A player can block any player within 5 yards of them. Calls the `distance_from_player` function.
- `assign_block`: Passes a Player object and assigns it as this player's blocking assignment. Defenders will be passed a "blocking assignment" as their value for which lineman is blocking them.

Variables

- `x`: Player's x coordinate.
- `y`: Player's y coordinate.
- `player_id`: Player's unique NFL Player Identifier.
- `on_offense`: Added identifier for whether or not the player is on offense.
- `blocking_assignment`: A reference to the Player object to which this player is assigned. Set to `None` by default.

Assignment

Class used to assign offensive lineman to a defender using a backtracking algorithm.

Functions

- `assign`: Takes an offensive and defensive player and refers them to one another as a blocking assignment.

- `remove_assignment`: Called by the `backtrack` function.
- `backtrack`: Uses backtrack search to assign each pass blocker to a defender. More on backtracking search can be read here:https://github.com/aimacode/aima-java/blob/AIMA3e/notebooks/ConstraintSatisfactionProblems.ipynb

Variables

- `off_players`: List of pass blockers in the frame.
- `def_players`: List of pass rushers in the frame.
- `num_off_players`: Number of pass blockers in the frame.
- `num_def_players`: Number of pass rushers in the frame.
- `frame_id`: Unique frame identifier within a play.
- `play_id`: Unique play identifier within a game.
- `game_id`: Unique game identifier.

Algorithm

From the blocking_assignment_algorithm_pseudocode.md:

```
Backtrack(assignment, off_players, def_players):
  if all players in off_players have a blocking assignment, return assignment
  lineman = next offensive lineman, ordered by y value
  for each defender in potential_assignments(lineman) do
    if the defender is not already blocked then:
      assign(lineman, defender)
      result = Backtrack(assignment, off_players, def_players)
      if result is not failure:
        return result
  return failure

potential_assignments(player):
  return an ordered list of potential defenders for a lineman to block by distance

assign(offensive_player, defensive_player):
  assign the two players as blocking/being blocked by one another
```