

Corresponding Raw Content in Books: b

Chart 2.1 Characteristics of the principle of penetration

... ..

B) Line of the ball and opponent's goal line.

- Reduce the distance between the player in 'possession of the ball and the opponent's goal or goal line;

Unbalance opponent's defensive organization;
Directly attack the opponent or the goal;
Create advantageous attacking situations in numerical and spatial 'terms.

... ..

Player in possession of the ball.

- Carrying the ball through the available space (with or without defenders 'ahead).
- Performing dribbles in search of numerical advantage in attacking situations or that enable the sequence 'of the play towards the opponent's goal line or goal.
- Carrying the ball towards the opponent's goal line or goal searching for favourable conditions for a pass/assistance to a teammate to resume the play.

....

Corresponding Aggregated Knowledge: K

```
'def assess_player_actions(player_observations, match_context,
ball_observations):'
'   player_actions = {}'
'   for player, observations in player_observations.items():'
"       if player.role == 'defender':"
'           player_actions[player] = assess_defender_responses(observations,
match_context.get_opponent(player), ball_observations)'
"       elif player.role == 'midfielder':"
'           player_actions[player] = assess_midfielder_roles(observations,
match_context)'
"       elif player.role == 'forward':"
'           player_actions[player] = assess_forward_decisions(observations,
match_context, ball_observations.get_goal(), ball_observations)'
"       elif player.role == 'goalkeeper':"
... ..
```

```
'def assess_forward_decisions(forward_observations, match_context,
goal, ball_observations):'
'   if is_in_shooting_range(goal) and
(ball_observations['is_controlled_by'] == forward_observations or not
'is_closely_marked()):'
'       if has_clear_shot(goal) or opponent_actions == 'shoot':"
"           return 'take_shot'"
'       else:'
"           return 'pass_to_better_positioned_teammate' or
'dribble_to_improve_angle'"
'   else:'
"       return 'move_to_receive_pass' or 'create_space_for_teammates'"
... ..
```

Retrieved Knowledge Scope: K^s

```
{ 'preferred scope description': "This policy is best suited for making tactical
decisions based on the opponent's system and style of play.", 'game_mode':
'Normal', 'active_player_role': "['Goalkeeper', 'Forward', 'Defender',
'Midfielder']", 'ball_ownership': "['Left', 'Right']", ... }
```

(1) retrieved by
 $(\{K\}, \{K^S\}) = \mathbf{R}_{\text{scope}}(\hat{s}, \mathcal{K}^S)$

Imaginary State: \hat{s}

```
"active_player": 1, "active_player_role": "Forward", 'game_mode': 'Normal',
"ball_ownership": 1, "ball_ownership_player": 1, "ball_zone": [11, 7], "ball_direction": "east",
"player_0": {"team": "Left", "role": "Goalkeeper", "zone": [1, 7], "direction": "east"},
"player_1": {"team": "Left", "role": "Forward", "zone": [11, 7], "direction": "east"},
...
"player_21": {"team": "Right", "role": "Forward", "zone": [10, 4], "direction": "west"}}
```

(2) instantiaed by $K_I = \mathbf{M}_{\text{inst}}(\hat{s}, |\mathcal{M}|, \{K\})$

Instantiated Knowledge: K_I

"analyze": "The current observation shows that the active player is a forward (player_1) from the Left team, who has possession of the ball in zone (11, 7). The ball is e defender (player_16) directly in front of him in zone (15, 7). **Given this setup and the provided code-based knowledge, the optimal decision for the forward would be to either dribble or pass to a teammate in a better position. Player_2 (another forward) is in zone (12, 7), which could be a good option for a short pass. Additionally, player_10 (forward) is in zone (11, 9), which might also be a viable passing option.**"],

```
'code': ['def football_manager_policy(observation):',
'   def should_shoot(player, goal_info):',
"       distance_to_goal = calculate_distance(player['zone'], goal_info['zone'])",
"       if distance_to_goal < 10 and player['confidence'] > 50:",
'           return True',
'       return False',
'   def has_space(player, opponents):',
"       for opponent in opponents:",
"           if calculate_distance(player['zone'], opponent['zone']) < 10:",
'               return False',
'       return True',
'   def determine_action_for_forward(player, ball_position, teammates, opponents):',
"       if should_shoot(player, {'zone': [20, 6]}):",
'           return 12 # action_shot',
'       elif has_space(player, opponents):',
'           return 17 # action_dribble',
'       else:',
'           open_teammates = [teammate for teammate in teammates
if calculate_distance(player['zone'], teammate['zone']) < 5]',
'           if open_teammates:',
'               return 11 # action_short_pass',
'           else:',
'               return 0 # action_idle',

"       if active_player_role == 'Forward':",
'           return determine_action_for_forward(observation[f'player_{active_player}'], "
'ball_position, teammates, opponents)',
'       else:',
'           return 0 # action_idle"',
]
```

(3) generated by $\hat{a} = \mathbf{M}_{\pi}(\hat{s}, K_I)$

Imaginary Action: \hat{a}

17 # action_dribble



corresponding scenarios (rendered by simulator)