

Support System for Focused Discussion in Consensus Building for Team Sports

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Abstract: In team sports, where cooperation among several players is crucial, it is essential that teammates have a consistent decision prediction of the next play to be taken in a particular situation. One way to unifying plays in each situation is to look back at the situation in which the cooperation failed and discuss which play should have been taken. In such a discussion, players predict future states resulting from plays and attempt to reach a consensus based on the optimal outcomes. At this point, if players have different perceptions of the current scene or future expectations, comparing predicted futures becomes ineffective, and players may be unaware of these differences. This study aims to facilitate focused discussions on the comparison of future scenarios by implementing a system that visualizes and compares individual decision-making processes for players with differing perspectives.

Keywords: team sports, decision-making process, consensus building, discussion support

1. Introduction

In team sports, where cooperation among several players is crucial, it is important to agree on the next play to be taken in a particular situation. To unify plays in various situations, teams often review instances of failed cooperation and discuss alternative approaches. During these discussions, each player predicts the future state resulting from potential plays and attempts to reach a consensus by demonstrating the advantages of their predicted outcomes. However, due to differences in assumptions, such as varying perceptions of the scene and the degree to which the future is predicted, comparing individually predicted states may prove ineffective. While differences may eventually be identified through discussion, the time spent reaching this realization is often inefficient.

Previous research on resolving differences of opinion has focused on identifying options acceptable to all participants or encouraging the development of mutually agreeable opinions (Perez, Cabrerizo & Viedma, 2010). However, such study primarily addresses cases where opinions are derived from shared assumptions and do not address the challenge of recognizing differences in underlying assumptions.

In this study, we aim to support efficient discussions between players with differing in decision-making processes by promoting awareness of the disparities in their assumptions. By developing a system that visualizes and compares individual decision-making processes, we seek to contribute to more effective and efficient consensus-building in team sports by supporting players notifying smoothly the differences in their assumptions.

2. Consensus Building and Differing Assumptions

Play consists of actions. Actions change states, and states determine possible actions. The effectiveness of an action with respect to the current state (hereafter referred to as the initial state) can be evaluated based on the desirability of the state at a predicted future point in time, as shown in Figure 1.

When players disagree on chosen actions, they typically compare the merits of the states on which they based their decisions to reach an agreement. However, this comparison is only meaningful if the states being compared are derived from identical assumption. For a meaningful comparison of predicted states, the following assumptions must be met:

1. The initial state recognition is identical.
2. The extent of future prediction is consistent.
3. The predicted states for the same action are identical.

If these assumptions differ, the ensuing discussion may be unproductive.

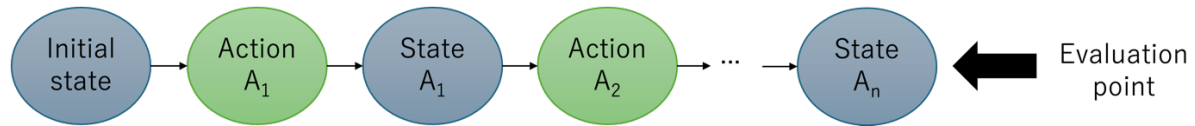


Figure 1. Evaluation Point of Action

3. How to Resolve Differences

Assumption 1 may not be satisfied due to players' different positions during play, leading to variations in recognizing the existence or location of other players. By aggregating the perceptions of both players, a more accurate representation of the initial state can be achieved. In this study, we aggregate the information recognized by both players and present it as a more comprehensive initial state (hereafter referred to as the integrated initial state).

Assumption 2 may differ due to varying depths of player thinking. By making others' thought processes visible, we encourage players with less developed strategies to think more deeply. Since assumptions 1 and 2 can be resolved through information sharing, we provide support for individual decision-making processes.

Addressing assumption 3 is more complex, as the state resulting from an action may be influenced by each player's values. Simply sharing the thoughts of others may not lead to convincing arguments. It is necessary for players to discuss their individual values and reach a consensus. Therefore, for assumption 3, we visualize areas where predictions differ in the discussion forum to promote the unification of state values for each action.

4. Discussion Focusing Support System

We have developed a discussion focusing support system shown in Figure 2, to support the resolution of differences among the three assumptions. The system consists of subsystems that support two phases: a decision-making representation phase in which each player represents their action-decision process, and a discussion phase in which the players discuss their actions afterwards.

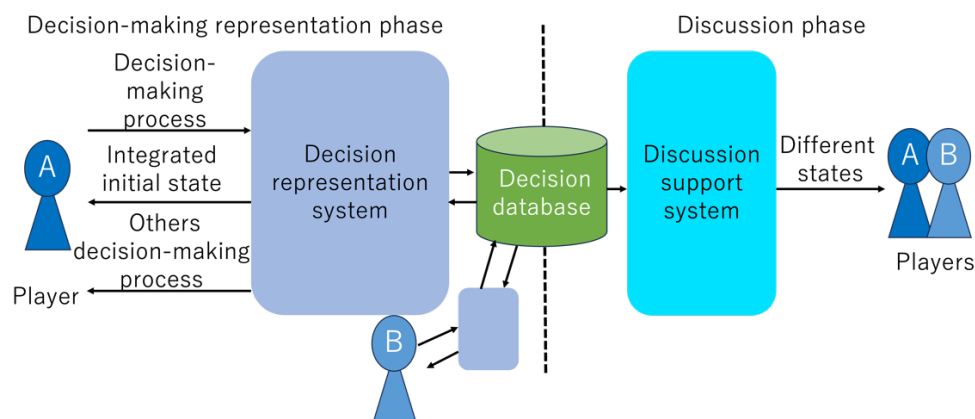


Figure 2. System Configuration

The decision representation system provides an interface for individual players to represent their decisions and supports assumptions 1 and 2 based on these representations. When the system is started, it first displays the Initial Input Interface. Users visually input the state they perceive by placing player positions on the court. Subsequently, the interface shown on Figure 3(a) is displayed, allowing users to input their decision-making process as a sequential input of actions and states from the initial state.

After the decision-making process is input, the square representing the action changes to red when the action leading to the optimal state is identified and selected. The input decision-making process is visualized in the decision display area and stored in the decision database. When the integrated initial state display button is pressed, the system retrieves the initial state of the consensus partner, generates an integrated initial state, and presents it using the information of player positions recognized by only one player, and the exact midpoint of positions recognized by both players. The others decision display button allows users to view the decision-making process generated by their partner.

The discussion support system provides a forum for discussion among players and facilitates the resolution of assumption 3 by presenting the points where the state changes brought about by actions differ among players. Figure 3(b) shows the interface of the discussion support system. The decision display area shows the decision-making process generated by each player. In the combined decision display area, the decisions of both players are shown as one common decision, with divergences highlighted as differences. By displaying different state transitions for the same action, players can understand the differences in state perceptions to be discussed.

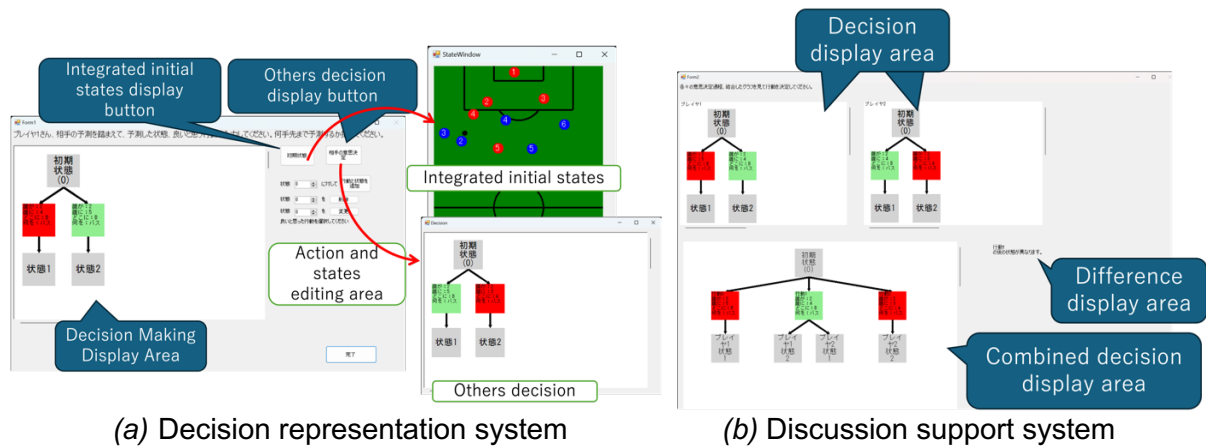


Figure 3. System Interface

5. Conclusion

In this paper, we propose a support system for focusing discussions to align assumptions in team sports decision-making. This system aims to improve the efficiency of consensus building by helping players identify and resolve differences in their underlying assumptions.

While the current system focuses on aligning assumptions, it does not yet support the formation of consensus in determining the desirability of a situation. To address this limitation, future work will involve constructing an interface that can describe the process from a given state to the ultimate goal. This will enable a more objective comparison of different scenarios and their potential outcomes.

References

- Perez, I. J., Cabrerizo, F. J., & Viedma, E. H. (2010). A Mobile Decision Support System for Dynamic Group Decision- Making Problems. *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans*, vol. 40, No.6, pp. 1244-1256