Benefitting from single-event-failures: The Dirty Dozen online coach 2002

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Abstract. Coaching is a task in which an agent is required to improve the performance of a team. This in the first place requires the agent to determine if the team needs help and if so how this help must look like. This paper proposes to model single-event-failures and use these as a basis for advice. Single-event-failures are easily observable events like losing the ball or letting an opponent pass the defense lines. Although these events are only symptoms of underlying weaknesses in the team strategy, they have great impact on the outcome of the game, and avoiding even only some of these failures leads to better results. On the other hand, benefitting from the opponent's failures should be tried.
Previous work on coaching focussed on gathering data about the opponent and generating advice like formations. While this can be useful in certain events, it cannot be successful in the general case, because the team may already employ a strategy or formation that is as good as or better than the advised one. So not only the opponent has to be modelled, but also the performance of the team. Only if the performance is suboptimal, changing the strategy is advised. The Dirty Dozen coach keeps track of which team is dominating by several statistical indicators. Additionally, single-event-failures of both teams are observed and the complete world-states of these situations are stored. Such failures are easily observable events like losing the ball or letting an opponent player pass the defense lines.
As soon as the indicators reveal that the coached team is inferior, the coach generalizes over the stored situations. Since clustering methods are too time-consuming to apply during game, several heuristics are used to categorize the situations. Based on these categorizations of situations, several messages to the team are generated. First the coach advises to acoid the action in question in the generalized situations. In the long run this is promising, but unfortunately not many teams are yet able to follow such do-not-rules. For an architecture which allows this, see the Dirty Dozen 2002 team description. Since the generalized events describe situations in which a failure is very likely to occur, the coach sends alternative actions to execute in these situations. This is an unobtrusive approach, because changing suboptimal behavior is more likely to improve the performance than deteriorate it. So based on the event type alternative actions are advised.
The other way around, a team can benefit from the mistakes of the opponent. So mistakes of the opponent are also gathered and generalized, and if a type of mistake occurs, the coach advices its players to repeat these actions.