WG1: Search, Planning, Learning, and Explainability

Informally, we may think of Working Group 1 (WG1) as the group about topics related to Artificial Intelligence (AI) techniques for decision-making, within the context of games. Here, "decision-making" basically means "selecting moves to make in a game". AI techniques under consideration in this group include (but are not necessarily limited to):

- **Search and planning algorithms**: algorithms that "think ahead" about the sequences of moves that players may make, in order to gain a good assessment of which moves are most likely to be the best in the long term.
- **Learning algorithms** (primarily reinforcement learning): algorithms that can improve their play from experience, learn to recognise relevant patterns, and generalise what they learned from situations (game states) encountered during their training process to situations that were not previously encountered.
- **Explainability**: techniques aimed to automatically generate explanations about why our algorithms are making the moves that they are making, or more generally generate explanations of relevant strategies and tactics to improve humans' understanding of the game.

For any of the types of techniques listed above, the focus should generally be on **general game playing settings**: we aim to build approaches that are applicable to a wide variety of games, **not only in principle, but also in practice**. This means that it should be possible to implement and use them in frameworks that can run many different games. Typically, these would be frameworks in which the rules of games are described in a highly convenient, succinct, and user-friendly game description language (or in natural language), rather than in highly specialised and complex languages or general-purpose programming languages.

While the Memorandum of Understanding lists many more, and more detailed, objectives, we may identify three major research topics:

1. **Human-like AI**: how can we develop AI techniques that do not merely aim to play as well as they can, but more accurately model the experience that humans would have (had) playing games? Algorithms should ideally provide distributions of different levels of playing strength, make human-like mistakes, avoid obviously non-human-like mistakes, have human-like biases and not have non-human-like biases, have different playstyles, and follow unwritten rules and etiquette. Ideally, their behaviour can be tuned according to information provided from anthropological or archaeological research in WG2 for different case studies (by whom was this game played, and why? By children, for fun, or by experienced players in competitive settings?).
2. **Imperfect-information games:** games with hidden information (e.g., card games) have received relatively little attention in truly general game playing settings. Algorithms for this class of games are still usually evaluated on one or a few games, with programmers encoding extensive knowledge by e.g. implementing functions to generate or sample from information sets by hand.
3. **Explainable search and reinforcement learning (RL)**: explainability is a large and growing topic in AI and machine learning more generally, but we can bring more focus specifically to search and RL algorithms, and their applications to games.

The primary channel for communication within WG1 is the following Google Group: https://groups.google.com/g/gametable-ai