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ARTIFICIAL INTELLIGENCE IN CONFLICT RESOLUTION

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ABSTRACT

In the past, contracting used to take place with the physical presence of the parties. Nowadays contracting can take place between parties located anywhere in the world and possibly involving automated agents. This reality poses new challenges to courts, which are still turned to a paper-based approach, shaped after the industrial revolution. Innovative approaches are thus needed to solve this new type of conflicts. In this work we look at Artificial Intelligence techniques and concepts and at how they can be used to create and improve cheap and efficient alternatives to litigation in court. Specifically, we consider Case-based Reasoning for compiling useful information, Genetic Algorithms to create additional solutions and Ambient Intelligence to gather context information. This will result in an environment for conflict resolution that is dynamic and able to adapt strategies in real-time in order to more rapidly achieve better outcomes.

ALTERNATIVE DISPUTE RESOLUTION

Alternative Dispute Resolution (ADR) refers to mechanisms that aim to solve disputes without recurring to the traditional judicial process, i.e. litigation in courts (Brown and Marriot 1999). This already traditional approach includes mechanisms such as negotiation, mediation or arbitration. However, the new forms of dispute that emerged with the evolution of the information society, mainly in the form of electronic contracting, demanded for a new approach to this problem. In that sense, Online Dispute Resolution (ODR) refers to the use of these mechanisms in a technological context, either supported by technology or under a virtual computational environment (Katsch and Rifkin 2001).

From a technological point of view, a relevant issue is to determine in what way and to what point traditional

mechanisms can be transplanted or adapted to the new telematic environments, taking advantage of all the resources made available by the newest information and communication technologies, namely Artificial Intelligence models and techniques that include but are not limited to Argumentation, Game Theory, Heuristics, Intelligent Agents and Group Decision Systems, as described by (Peruginelli and Chiti 2002; Lodder and Thiessen 2003).

The ultimate goal of AI research in this field is to accomplish a technological threshold, resulting in computational systems that are indeed the 3rd party. In this sweeping approach, there is no major human intervention on the outcome or in guiding the parties to a specific situation.

COMPILING USEFUL INFORMATION

Parties that have poor access to important information generally make bad choices or, at least, they hardly make the best ones. An important step on the conflict resolution is thus to point out information that may be useful for the parties to gain a realistic understanding of the conflict. In this work we use a Case-based Reasoning (CBR) approach to look at past cases and compile a set of important information that includes the best and worst alternatives to a negotiated agreement (respectively denoted as BATNA and WATNA), the most likely alternative (MLATNA), the Zone of Potential Agreement (ZOPA) and a list of past similar cases that may be of interest (Carneiro et al. 2011a).

ENVIRONMENTS FOR CONFLICT RESOLUTION

As case-based approaches may have drawbacks, mainly when there is a poor database, we are using a Genetic Algorithm (GA) to generate potential solutions for the resolution of the conflict. Under this approach, each solution is seen as an individual of the population, which is evolved through the successive application of three genetic operators: Crossover, Heredity, and Mutation. These operators enable the natural emergence



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of species: lines of evolution that generate solutions that are better for a given party.

Based on this algorithm, we developed the concept of Environments for Conflict Resolution (Carneiro et al. 2011b). The environment is able to collect information about the context of interaction, including the stress of the parties and the classification of each one's personal conflict style. The conflict resolution platform will then make use of this information in order to guide the process. It results in a dynamic process as it is able to adapt strategies in real-time. As an example, if the stress level of one party is consistently rising, the system might decide to propose a solution whose utility is higher for that party, in an attempt to increase its satisfaction with the process. All this is done dynamically, by walking in the tree generated by the Genetic Algorithm.

CONCLUSIONS AND FUTURE WORK

The work developed so far resulted in a conflict resolution platform based on negotiation that is able to adapt strategies in real-time according to significant changes in the context of interaction. In future work we aim to consider more context information, namely the emotional state of the parties, with the aim of improving the context-awareness of the conflict resolution platform and equip it with capabilities usually associated to the ones of humans experts.

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