

# Automated scoring of debates

## **The context: strategic conversations**

Debates are examples of conversations where the ultimate goals of the participants are typically opposed. Debates also usually have an ‘outcome’ which is basically the determination of who ‘won’ the debate. Such an outcome is usually decided by the audience of the debate based on how it scores the performance of each of the participants. In such conversations it matters not only ‘who’ says ‘what’ but also ‘when’, ‘how’ and under what ‘context’ one says it. Each participant thus has to plan his or her next ‘move’ based on (i) what his or her eventual objectives in the debate are (ii) what has been said so far (iii) what he or she believes the opponents’ plans and objectives are (iv) what he or she believes the audience expects them to convey in the debate etc. In other words, such conversations are ‘strategic’ in which each participant strategises to achieve a desired outcome.

It is thus natural to model such conversations as games. Attempts to this end have been made in the past with the most notable of them being the use of signaling games. However signaling games fail to capture the true essence of such conversations due to their inherent restrictions. Strategic conversations have certain characteristics unique to them viz., they are sequential and inherently involve a ‘turn structure’, the ‘moves’ by the participants are linguistic entities which carry a lot of semantic content, the presence of the audience or a ‘jury’ which scores the performance of the participants and determines the winner. Also, most importantly such conversations are potentially infinite and do not have a ‘set end’. When a group of people engage in a conversation they do not know at the outset how many turns it will take for the audience to come to their conclusion. Hence they cannot strategize for a set horizon when starting a conversation.

Keeping the above points in mind, [3] modeled strategic conversations as infinite games over a countable vocabulary  $V$  which they called Message Exchange games (ME games).  $V$  was taken to be a language of discourse moves (from the well-established theory of SDRT [1]) to preserve and utilize the semantic contents of the moves of the players. ME games also have a ‘jury’ who determines the ‘winning conditions’ of the players. A winning condition for a player is simply a set of sequences over  $V$ . [2] extended the setting of ME games by introducing a scoring function whereby the jury can assign a score to every move of each player based on the strength of the move vis-a-vis the context of the conversation so far. The score is based on whether the move is ‘coherent’, if it

is an ‘attack’ or a ‘response’ a ‘comment’ or other such linguistic factors. The final score of a player for the entire conversation is a discounted sum of his or her individual scores. The player with the higher eventual score is declared the winner. Scoring is thus a way for the jury to determine the winning conditions for the players. [2] called such games Weighted Message Exchange games (WME games).

### **Aim of the project**

The aim of the project is to study various documented debates and model them as WME games. For example, almost the entire corpus of the recent US Presidential debates is available online. The student will model one or more of such debates (whichever interests him or her and is non-trivial) as WME games. He or she will then assign scoring functions ([2] calls them weighting schemes) to the moves of the players. This can then be used to compute the overall scores of the players and predict the winner. Based on whether the prediction agrees with the actual outcome of the debate(s) the scoring function will then be revised. The process will be repeated till the prediction of the WME game framework matches the outcome. Time permitting, the student will explore the automatic extraction of simple features and then more complex ones from the data to automate a debate scoring program.

### **Motivation for the student**

In this project the student is expected to learn various concepts of game theory and esp. infinite games on finite and countable vocabularies, utilities, expected utilities, optimal strategies and discounted-payoffs. He or she will also learn concepts of discourse theories like SDRT and the semantics and pragmatics of dialogues.

### **Motivation for the supervisor**

The project fits very well into the broader theme of ongoing research on strategic conversations. The work done by the student will help validate the theories put forward in [3, 2]. In particular, the work on the comparison of the predicted outcome and the actual outcome of the debates will provide an indication of how ‘fair’ or ‘biased’ the jury for the debate is. The study of fair and biased jury is currently being pursued which has important consequences for the epistemic behaviour of the players of the game.

### **Contact**

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## References

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- [2] N. Asher and S. Paul. Evaluating conversational success: Weighted message exchange games. In J. Hunter and M. Stone, editors, *20th workshop on the semantics and pragmatics of dialogue (SEMDIAL)*, New Jersey, USA, July 2016.
- [3] Nicholas Asher, Soumya Paul, and Antoine Venant. Message exchange games in strategic conversations. *Journal of Philosophical Logic*, 2016. In press.