Abstract: this report is to describe the purpose, progress and outcome of the STSM the author participated in. The aim of the project described in the report is to develop a bot capable of playing the Diplomacy game (Calhamer, 2000) in the dip framework (Fabregues & Sierra) – the so called SillyBot working in strategy level, and its successor SillyNegoBot.

**Introduction**

First and foremost, the topic of human negotiation, more precisely in Diplomacy, is rare if we consider only the scientific approach. Although there is a small community that tries to develop bots capable of negotiating, most of the attempts are not based on any prior research in the topic, not regulated in any way and often produce either a bot that is not able to negotiate well or not produce anything at all. The side effect of this situation is that there are not many people capable of discussing agent-human negotiation and experienced enough in the topic. Authors of the dip framework belong to this small group, and SillyBot is being created in this their software. These two facts are main reasons for this STSM.

**STSM**

Work carried out during this STSM can be separated into two parts – the designing one and technical one. The first one focused on creating initial architecture for level 1 (Fabregues & Sierra, Testbed for Multiagent Systems) SillyNegoBot and deciding on technologies to be used. The latter ones aims were repairing and enhancing the current SillyBot, understanding the structure of level 1 language and how to use the dipNego. Moreover, opinions received on the current system and the new framework version, along with explanation of changes, proved very valuable.

Important to mention is also the discussion on the current state of Diplomacy community. It has affected the direction of the project. Focal points were:
• re-analyzing the DAIDE language versus dip language – although it seems that more of the bots are using the first one, most of them are worthless for further research and testing; moreover the language itself lacks formalization and the scientific approach that dip one has. It is also important to note that there were no bot updates since February 2010

• DumbBot, the current benchmark bot for level 0 - although performing well, is badly documented and has a number of ‘magical’ things – therefore it works, but it is hard to understand why; it often requires rewriting to suit the developers’ purpose better

Main results

Before the STSM work on SillyBot has almost stopped due to several implementations and logical issues. This visit provided a fresh look at the problems, and we have managed to solve them in a way that was both uncomplicated and ‘local’ – changes did not affect rest of the bot more than necessary. Unfortunately correcting the malfunctions made hidden errors visible and required additional work. Very often logical problems can be detected only by step-by-step analysis of each decision of the bot and log reading, which proves to be time consuming. I believe that the bot corrections I have made at the institute were not something I would have come to in any other way. Due to working on the bot alone, there is simply no one on the spot to discuss the topic with. Moreover, we have already experienced that solving problems through e-mail was not exactly satisfactory – unfortunately my descriptions were rather too complicated and unclear and slowing us down even. It is nowhere close to face-to-face discussion with a whiteboard nearby.

The effectiveness of a bot is measured by how it performs against benchmark bot. For the past months it was the DumbBot, however, after the visit it is now the level 0 institute bot. The purpose of this change is the fact that the higher level negotiation bot will also come from the institute. As a result performance of SillyNegoBot should not be affected by board strategy. Due to the big amount of changes in the SillyBot, only sample tests were made in order to speed up the work. By this we understand that we run the bot approximately 10 times and if results are satisfactory, we move to bigger tests, otherwise run it step-by-step and correct the errors. Although thanks to the STSM bot is performing better and does not produce runtime exceptions, it still needs heuristic corrections.

From the strategy level we can go into two directions – either the DAIDE (Norman) or dip syntax. Although initially the decision was to follow DAIDE due to the community size, now the SillyNegoBot is going to be based on dip language. This is reasonable not only for the reasons mentioned in the previous section, but also for the fact that I am convinced that soon enough popularity of the framework will increase. As a result bots that will be developed in the future will most likely not be using DAIDE syntax anymore.

Another important result is the design of the negotiation bot. Chance to see the technical side of the institute’s negotiation bot was invaluable. Thanks to it I managed to finally clarify and decide on the SillyNegoBot’s architecture. Although I lack the experience and knowledge to be able to create a project as professional and advanced as the IIIA-CSIC team, I hope that both bots will perform well. The informal documentation of the design can be found attached to this report.
Future Collaboration

SillyBot and its successor, the SillyNegoBot, are created in the dip framework therefore collaboration with its authors is not surprising. SillyBot still requires several improvements that will make it more flexible and increase performance; full documentation and user guide is also needed. After that the bots code will be made available for other developers, especially the IIIA-CSIC team. This can prove valuable as there is currently no strategy bot available capable of competing with DumbBot. Due to DumbBot’s nature, one is needed – with a clear design, flexible and more formalized. SillyBot can be modified in various ways – from just plugging in a different heuristic to changing its internal reasoning. Moreover it is completely created in the dip framework and by someone outside the team; it is a live example of using the framework. However, most importantly, dip framework is the future of the Diplomacy - it has the professional approach, takes care of all technical issues, is error free and simply speaking is just what the community needs. Thanks to the framework level of programming skills and purely technical knowledge of protocols required from a developer is lower. One does not have to waste time on issues like connecting to the server and can focus on the bots AI – often in order not to bother with these technical and strategy layers, people try to extend DumbBot. It is easy to see how useful and appealing it would be to have the chance to go directly to the negotiation levels. Hopefully freeing the SillyBot will make such a ‘jump’ possible.

The focal point of future collaborations will be the SillyNegoBot. There are not many bots available that are capable of playing level 1, and quite a number of them were created by Diplomacy enthusiasts just for fun rather than by computer scientists that want to use them for research and human negotiation. This basically means that there is barely any competition and testing a level 1 bot is very difficult - in case of a single developer it can end up with just running the bot against its author. A benchmark is needed; an opponent is needed; one cannot test a negotiating bot solely against humans as it is simply not doable. Therefore cooperation and exchange of bots is necessary. Just like its predecessor SillyNegoBot will be published once it performs well enough.

Publication

The design of SillyNegoBot bases also on some technical knowledge I have gained during NATO-ASI summer school that took place in September in Morocco this year. A book containing the lectures given during the school is going to be published by IOS Press in 2011. Moreover, participants are given an opportunity to contribute a paper related to the presented material. Although I cannot say whether my submission will be accepted, it will definitely include the fact of the huge impact of this STSM on my work and the resulting system design.

Acknowledgments

Thanks to COST Action IC0801 for giving me the opportunity to go on this STSM; to Angela Fabregues for her patience and constant help in bot development; to Dr Carles Sierra for encouraging me to re-think the BDI-SOAR fight and allowing me to visit the institute; to my supervisor Dr Marcin Paprzycki.
for finding new opportunities to present human negotiation; and to IIIA-CSIC overall for a warm welcome and pleasant stay.

Bibliography


