

User Behavior, Social Networking, and Playing Style in Online and Face to Face Bridge Communities

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I. INTRODUCTION

Traditional games have recently started to become online social games. Once accessible only through face to face encounters or slow mail exchanges, games such as bridge, chess, and go are now played online by millions of gamers. Other online social games, such as FarmVille and Cafe World, already exploit the characteristics of the social network formed by gamers to improve and grow the online communities. For example, FarmVille routinely gives high-level (expert) players new items and broadcasts gameplay achievements through the social links. User behavior, social network, and play style analysis are not new research topics [1]–[4], but the study of online social gaming communities provides a new domain of application with the potential to influence millions of lives. In this work we analyze and compare two communities of bridge players, Locomotiva and BBO Fans.

Bridge is a popular game for groups of four people playing in pairs. Bridge was the only team game at the last World Mind Sports Games (Beijing, 2008). We are interested in duplicate bridge, where the same distribution of cards is played at several tables and the winner is decided by comparing the results at each table. For a view on bridge communities as social networks we refer to our previous work [5].

II. BRIDGE COMMUNITY DATASETS

We have collected two datasets, each corresponding to the long-term operation of a large bridge community. Specifically, we have collected information about one face to face bridge community, Locomotiva, and one online community, BBO Fans. The BBO Fans community uses the services of a general online bridge platform, BBO, through which they may play bridge with non-BBO Fans members. Table I summarizes the properties of the collected datasets.

TABLE I
THE BRIDGE COMMUNITY DATASETS.

| Characteristic | Locomotiva | BBO | BBO Fans |
|------------------|--------------------|--------------------|----------|
| Period | Jan 1–Dec 31, 2009 | Sep 5–Oct 15, 2009 | |
| Tournaments/Week | 4 | n/a | 21 |
| Players | 275 | 142,401 | 8,609 |
| Hands | 28,756 | 3,115,536 | 565,799 |

Locomotiva is a traditional, face to face bridge club located in the center of Bucharest, Romania. Our expert knowledge about the organization and personal relationships in this community make it an ideal study item (“ground truth”). Bridge Base Online (BBO) is one the most popular free platforms for online bridge. We focus in this work on the BBO players that are also members of the BBO Fans community, which is a large online bridge community based on the BBO platform.

III. ANALYSIS RESULTS

We present a selection of analysis results; for a description of the method and for more results we refer to our technical report [6].

A. User Behavior

We have analyzed the number of players and hands over time for BBO and BBO Fans in our previous work [5]. Our main finding was the presence of a steady daily activity in the BBO Fans community, and similar in intensity with similarly-sized games on FaceBook. We have repeated the process with the Locomotiva dataset, and found a relatively stable number of played hands and just a few tournament sizes. We also found a much less stable number of players, which is mainly explained by the different tournament formats, by the overlap between club and national or international tournaments (especially on Fridays), and by holiday and vacation periods.

B. Community Structure

We consider that two bridge players have a social relation if they relate strongly through play: they have met online, have played as partners and/or opponents a number of hands (aspect P in our formalism), or have played in a number of sessions together as partners and/or opponents (S). We have previously [5] investigated this play-related relationship concept for the “number of hands played together”. One of the main contributions of this work is extending this investigation

TABLE II

COMMUNITY STRUCTURE CHARACTERISTICS FOR LOCOMOTIVA. N IS THE NUMBER OF NON-ISOLATED NODES; NC IS THE NUMBER OF COMMUNITIES; CS IS THE MEAN COMMUNITY SIZE; Q IS THE MAXIMUM MODULARITY. WE HAVE TRIED MANY OTHER CRITERIA.

| Single-aspect | N | NC | CS | Q |
|--|-----|----|------|------|
| $P_+ \geq 20$ | 249 | 35 | 7.11 | 0.22 |
| $P_+ \geq 100$ | 109 | 28 | 3.89 | 0.36 |
| $P_+ \geq 200$ | 87 | 30 | 3.90 | 0.43 |
| $S_+ \geq 3$ | 138 | 29 | 4.75 | 0.30 |
| $S_+ \geq 10$ | 83 | 30 | 2.76 | 0.43 |
| Multi-aspect | N | NC | CS | Q |
| $(P_+ \geq 80) \text{ OR } (S_+ \geq 4)$ | 119 | 27 | 4.40 | 0.34 |
| $(P_+ \geq 160) \text{ OR } (S_+ \geq 8)$ | 94 | 28 | 3.35 | 0.41 |
| $(P_+ \geq 200) \text{ OR } (S_+ \geq 10)$ | 87 | 30 | 2.90 | 0.43 |

with (many) other types of playing relationships. We also consider in this work that playing relationships are cooperative (P_+ , S_+) or adversarial (P_- , S_-), and consider not only single-aspect but also multi-aspect criteria.

We have extracted the communities present in Locomotiva using a greedy algorithm [7]. We have only used combinations of cooperative play aspects (P_+ and S_+), as adversaries are randomly assigned in most Locomotiva competitions. Table II summarizes the main community characteristics observed for Locomotiva for various play relationships. The results obtained with the multi-aspect criterion are identical with the results obtained when using the single criterion $P_+ \geq$. We explain this through the regular structure of the tournaments (sessions) played at Locomotiva; since players rarely leave a tournament, and the number of hands played by each player during each tournament is intended to be stable (20–25 hands), S and P are correlated for Locomotiva.

The communities obtained were manually examined by two independent experts: one of the organizers of the Locomotiva tournaments and a regular member of the club. To help the experts better identify the communities produced by the algorithm, we have provided a visualization of each community. The experts examined the communities extracted automatically for each set of criteria/parameter values and concluded that the best criterion for the Locomotiva dataset is $(P_+ \geq 200) \text{ OR } (S_+ \geq 8)$. For these values of the S and P parameters, the modularity obtained is 0.43 (the value for $P_+ \geq 1$ is only 0.2), which also indicates a good community structure for the chosen parameters. The results corroborated with the low average community size show that the communities in face to face bridge are small, with most players having only one regular partner.

We have normalized the parameters obtained for the Locomotiva dataset according to the time interval during which the data was gathered, as P and S are cumulative. We have computed the BBO Fans communities with the normalized parameters and obtained 4,373 communities and a modularity is 0.43—the same maximum modularity obtained for Locomotiva. Over 90% of these communities have at most 4 players.

C. Playing Style

We analyze in this section the gamer playing styles for the face to face and for the online community, using the

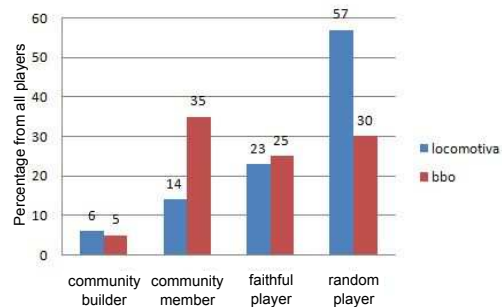


Fig. 1. Percentage of players by player type.

play styles introduced in our previous work [5]. The players from the Locomotiva community were classified by our two experts, together. The BBO Fans players were classified automatically, starting from the social graph computed and used in Section III-B. The results for the two communities are summarized in Figure 1. The community builders and the faithful players represent the same percentage of the player base in both communities, about 5% and 25%, respectively. The percentage of random players in the community is high for both communities. We attribute this situation to many players finding it difficult to adjust to the rigors of a fixed tournament schedule. Perhaps surprisingly, there are significantly more random players in the face to face bridge club than in the online club (57% and 30%, respectively). We attribute this discrepancy to the additional requirement of physical presence raised by Locomotiva, and to the relative ease of becoming a community member through the means of a round-the-clock, online platform such as BBO.

IV. ONGOING WORK

We are currently investigating new criteria for player classification according to our proposed taxonomy, and gathering data to perform a more in-depth analysis of the BBO Fans club and its underlying gaming platform. For the future, we plan to investigate ways to improve the BBO gameplay experience, and to compare online bridge communities to communities organized around other social games.

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