

Predicting Player Type in Social Network Games

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Abstract. This paper presents preliminary work towards personalizing and recommending social network games based on a user's player type. In particular, we present research aimed at supporting such personalization through the prediction of player type from automatically collected user data. We first provide a brief overview of player types, and then outline several data sources that we gathered from a popular social network game to study the feasibility of player type predictions. Finally, we perform a preliminary analysis using one of these sources, namely music interests.

Keywords: Games User Research, Personalization, Machine Learning

1 Introduction

As of 2013, over 250 million users regularly play games each month on Facebook [1]. With the explosive growth and widespread popularity of social network gaming, players are faced with the increasingly difficult challenge of discovering games that are enjoyable and remain engaging. To address this concern, the long-term goal of our research is to improve users' social network gaming experience through personalization. Previous research pertaining to user differences in online gaming environments has typically focused on characterizing player behaviors and preferences using the Big-5 personality traits [2, 3, 4]. However, a potentially more relevant trait that ought to be considered in games is *player type*, which characterizes users based on the games they prefer, as well as their individual playing styles [5]. By taking into account player type, personalizing a user's game experience *within* a game could be implemented in order to improve player engagement by offering, for example, additional in-game content like extra quests or virtual goods. Furthermore, matching player types *across* games would also be advantageous to both players and advertisers/traffic-exchangers, since players could be offered games that more strongly match their individual player type. Unfortunately, administering questionnaires to ascertain player type is costly, and can have a potentially negative impact on players by intruding their game experience, and may even make them feel uncomfortable. In this paper we provide a brief overview of player types, and outline two data sources we collected to study the feasibility of automatically inferring *player type* from: i) general user interests available through the Facebook social graph; and ii) user behavior data.

As a first step to investigate the feasibility of utilizing these data sources, we present a preliminary prediction analysis using users' Facebook music interests.

2 Player Type

Player type can be measured using the BrainHex player typology [6], which provides a model based on prior findings from player research and neurobiology. This model has been applied successfully to adapt persuasive games to player types [7], and to develop design guidelines for personalized game systems [8]. It distinguishes between the following 7 different types of players: *'Achievers'* are often satisfied by completing tasks or collecting things (e.g., badges). They are goal-oriented and motivated by the reward of achieving long-term goals [5]. *'Conquerors'* enjoy struggling and the defeat of difficult opponents before achieving victory. They show forceful behavior, and channel their anger to face and overcome difficult challenges. *'Daredevils'* are excited by the thrill of taking risks and enjoy playing on the edge. The enjoyment of game activities such as navigating dizzying platforms, rushing around at high speeds while still in control characterizes the Daredevil. *'Masterminds'* enjoy solving puzzles, devising strategies to overcome difficult puzzles, and making efficient decisions. *'Seekers'* enjoy exploring things and discovering their surroundings. They are curious, have sustained interest, and love sense-stimulating activities. *'Socialisers'* enjoy interacting with others. For instance, they like talking, helping, and hanging around with people they trust. *'Survivors'* love the experience associated with terrifying scenes and the thrill of escaping from scary situations.

3 Data Sources & Collection

Our pool of users was obtained via a Facebook game, Pot Farm, where players perform actions such as planting and harvesting crops, collecting gold, completing quests, and unlocking achievements (see [9] for an overview of 'Ville style games). In order to gather ground-truth values for users' player types, we collected 3487 BrainHex player type questionnaires over a period of one week. Participation was optional and players were offered a reward of premium in-game content for completion. Given that reliability is always a concern with online surveys, data was cleaned via several methods and resulted in 2009 valid users.

Facebook Profile Interests: For each of the users who completed the BrainHex player type questionnaire, we collected preference data available to us according to the permissions enabled when a user installs Facebook games. This data consisted of three categories: Music interests, Movie/Television interests, and Game interests. In total, we obtained profile data from 1899 users (i.e., approx. 55% of surveyed users).

This data source is particularly interesting because it can be obtained independent of any specific game, and thus game personalization and recommendation can be performed without requiring any prior game experience. In fact, it has been reported that one third of users opting to play games on Facebook are entirely new to gaming, meaning that social network gaming is their first exposure to gaming [10]. This sug-

gests that many of these new users may have either a minimal or limited understanding regarding their own player type, which highlights an even greater need to offer personalization by detecting player type based solely on other existing interests.

Game Telemetry: In addition to gathering general Facebook profile information, we also collected users' in-game behaviour such as logins, achievements, level, etc. While this data source is richer in terms of games-related behavior, a potential limitation is that it is restricted to events from one game. Therefore, while results will be very useful for in-game personalization for this game, they might not apply to other games. Nevertheless, our intuition is that there likely exist certain types of actions that will be indicative of general player type(s), therefore it could be transferrable to the personalization and/or recommendation of other games.

4 Prediction Experiments Based on Music Interests

In the previous section, we outlined multiple data sources and our intention is to evaluate each of them as candidates to predict player type. As a preliminary investigation, we selected Facebook profile music interests as a first step to understanding the feasibility of such predictions. Research has already shown that music preference relates to personality [11], and personality in turn has been linked to online games [2, 3, 4]. Therefore, since the player type constructs have roots in psychological typology, our supposition is that music interests could be a promising data source to predict player type. Additionally, we also had intuitions regarding the connection between playing style with music style. For example, *Daredevils* or *Survivors* may prefer musical moods that are more aggressive (e.g., heavy metal or industrial/trance).

In order to capture the general mood of a user's music interests, we first obtained a set of mood tags for each music interest from a popular music website Allmusic.com. Mood tags are used to describe musical qualities based on the emotional or aesthetic properties of a given band/artist (e.g., cheerful, rowdy, sensual). Next, we counted the frequency of each mood tag, and used these values as features for our classifier. Since there are 7 player type constructs, and each user can be classified to one or multiple player types, we ran a separate classifier on each type. Our classification experiments use the WEKA data mining toolkit for model learning and evaluation. Using 10-fold cross validation, we evaluated several algorithms using correlation-based feature selection method. R values for the top two classifiers are reported in Table 1.

Table 1. R values for player type prediction results.

	Seeker	Survivor	Mastermind	Conqueror	Socialiser	Daredevil	Achiever
Linear Regression	0.12	0.07	-0.05	0.11	-0.13	0.01	0.01
Decision Table	0.16	0.07	-0.02	0.04	-0.11	0.04	0.11

These initial results are not very strong and indicate the need for either an improved theoretical approach, or that music interests and player type are not directly related. One interpretation is that the relationship between everyday life personality and music interests does not necessarily match their personality or player type in online games.

5 Conclusions and Future Work

The main goal of our work is to personalize the social network gaming experience by considering a user's player type. In this paper, we provided an overview of different player types, and presented several potential data sources for automatic predictions. Finally, we performed a preliminary prediction analysis using one of these sources, i.e., music interests. While these initial results were rather weak, our future work will consist of the following: in addition to performing classification experiments using movies/television and games interests, we will investigate several features presented by Golbeck et al. [12], who successfully predict personality from a user's Facebook profile using methods that incorporate linguistic and structural features. In our future work, we also aim to use a more theoretical approach, for example, by categorizing the genres of music interests into the four music-preference dimensions identified in [13], which has already been shown to relate to personality. Lastly, we plan on analyzing the game telemetry data, which consists of several months worth of recorded in-game user behaviour.

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