Game Analytics and Player Profiling – A Short Reading List

Introduction and Scope
Game analytics has in some ways been a part of games since developers started looking at how people actually play games, i.e., from the very beginning, but it is in recent years that analytics has become more deeply integrated in game development across the indie and AAA. Unfortunately, the level of available information has not followed this rather explosive development, meaning that for finding useful information can be difficult. The goal here is to provide a brief guide to some of the core literature in game analytics in general, and a number of references to material specific to the topic of using clustering to develop behavioral profiles in games.

Additional links and references can be found on the Game Analytics Resources site at: www.andersdrachen.com. Slides from the talk will be available on the same site.

Books on Game Analytics
There are currently (at least) five books on game analytics, or very closely related to it/mentioning it, on the market. One is a comprehensive mastodont which covers a variety of topics, the others are focused more specifically on analytics-related topics either directly concerning games or related to this topic. These can be supplemented by a few texts on business intelligence and analytics in general, as well as books on data mining.

Game Analytics: Maximizing the Value of Player Data
Edited by El-Nasr, Drachen and Canossa, this 800-page mammoth covers a variety of topics in analytics, with a focus on behavioral telemetry and its role in game development and research. Aimed at both beginners and experts, and authored by more than 50 experts from industry and research, it covers many important bases such as game data mining, visualization, monetization and user research, as well as topics such as metrics for learning games and quantitative user testing. The sheer scope of the book means that everyone will find something of interest inside, but it should be noted that the book is aimed at providing information and coverage rather than a how-to volume. (disclaimer: I am an editor on this book and therefore horribly biased).

Social Game Design: Monetization Methods and Mechanics
Authored by the experienced developers Tim Fields and Brandon Cotton this book focuses on the design and business side of social game development, and outlines what makes games compelling and why people will pay to play them. The book handily outlines different business models, player acquisition strategies, analytics strategies and retention considerations. Recommended for both beginners and experts in analytics who work with social/online games. An excerpt available on Gamasutra.com.

Freemium Economics: Leveraging Analytics and User Segmentation to Drive Revenue
Your freemium product generates vast volumes of data, but using that data to maximize conversion, boost retention, and deliver revenue can be challenging if you don’t fully understand the impact that small changes can have on revenue. In this book, author Eric Seufert provides clear guidelines for using data and analytics through all stages of development to optimize your implementation of the freemium model. Freemium Economics demystifies the freemium model through an exploration of its core, data-oriented tenets, so that you can apply it methodically rather than hoping that conversion and revenue will naturally follow product launch. Written by Eric Seufert.
Free 2 Play: Making Money From Games You Give Away
This book covers a wide range of topics from psychology of players, game design techniques, and an introduction to basic game analytics practices. By Will Luton.

The Curve: How Smart Companies Find High-Value Customers
In The Curve, Nicholas Lovell weaves together stories from disparate industries to show how smart companies are solving this puzzle. From video games to pop music to model trains, the Internet helps businesses forge direct relationships with a vast global audience by building communities and offering bespoke products and experiences. By Nicholas Lovell.

Online Introductory Readings
There is a wealth of information about game analytics available online, but it is fragmented and it can be difficult to extract actionable insights due to this. Some of the online information stands out by being clear, understandable and written with an applied focus. Examples include but are not limited to the following.

Game Analytics: the Basics
This is an early version of a document that later became an introduction chapter in the book "Game Analytics – Maximizing the Value of Player Data". It is intended as a basic introduction to what game analytics is for the non-expert and forms a place to start.
URL: http://andersdrachen.files.wordpress.com/2013/07/02drachenetal02.pdf

Halo 3: How Microsoft labs invented a new science of play
The article by Thompson in Wired Magazine about Microsoft Studios Research’s and Bungie’s work on game user research is one of the fundamental pieces of writing in game analytics. Thompson focuses on the specific situation of user testing in AAA-level contexts, and outlines how Microsoft and Bungie started integrating analytics in their studies of player behavior with great success.

Do You Speak Metrics?
Justin Johns provides a quick vocabulary of the key metrics in online/F2P, defining terms like event, DAU, MAU, K-factor and similar. He describes the more common terms and acronyms used in monetization analytics, and also provides a quick overview of funnel analysis, split testing (A/B testing) and cohort analysis.

Intro to User Analytics
Magy Seif El-Nasr, Alessandro Canossa and Anders Drachen (disclaimer: that’s me – horribly biased), writes about feature selecting, i.e. finding out which user behaviors to track in games.
URL: http://www.gamasutra.com/view/feature/193241/intro_to_user_analytics.php?print=1

Game Telemetry with Playtest DNA on Assassin’s Creed
Ubisoft has started up their own development/analytics blog, The Engine Room, where the teams there write about the highly interesting work they are doing on game analysis. The three-parter on analyzing player behavior in Assassin’s Creed are highly interesting stuff, covering trajectory analysis, heatmaps and the relationship between user testing and design. Update: The Engine Room has shut down, but Jonathan Dankoff has published the material on Gamasutra.
URL: http://www.gamasutra.com/blogs/JonathanDankoff/20140320/213624/Game_Telemetry_with_DNA_Tracking_on_Assassins_Creed.php

Predicting Churn: Data-Mining Your Game
Dmitry Nozhnin provides an excellent account for how an indie company with no experience in data mining started looking into and predicting the behavior of their players. The follow up, also available on Gamsutra.com, focuses on veteran players.
URL: http://www.gamasutra.com/view/feature/170472/predicting_churn_dataminin_.php
Material on Cluster Analysis

There is a wealth of literature on machine learning, data mining and cluster analysis in particular, but only a limited amount of research on the application of these domains to games specifically. This is rapidly changing thanks to the popularity of game AI and game analytics as research domains, however. One problem with much of the literature on cluster analysis and games is that it is located behind the paywalls of academic publishing. Some material can be found via pre-prints in open-source repositories like arxiv, or via scientist social networks like ResearchGate and Academia.edu. Additional information is available via the personal websites of the authors. GoogleScholar is a good search engine for finding research papers and seeing if they are freely available. For papers only accessible via a publisher, visiting a university library can usually help.


Material on Cluster Analysis Applied in Games

These are references specifically on cluster analysis in the context of digital games. The list here only includes a few examples, but the bibliographies in each of them provides numerous links to additional material.

Introducing Clustering I-IV. Available from blog.gameanalytics.com or gamasutra.com

Clustering Game Behavior Data. Upcoming in the IEEE Transactions of Computational Intelligence and AI in Games. Bauckhage, C. and Drachen, A.

Guns, Swords, and Data: Clustering of Player Behavior in Computer Games in the Wild, in Proceedings of the Computational Intelligence in Games Conference. Drachen, R. Sifa, C. Bauckhage, and C. Thurau. URL: andersdrachen.com/publications/


Archetypical Motion: Supervised Game Behavior Learning with Archetypal Analysis, R. Sifa and C. Bauckhage, in Proceedings of the IEEE Computational Intelligence in Games Conference, 201309.