Lecture 17

Game Analytics
The Rise of Big Data

- Big data is changing game design
  - Can gather data from a huge number of players
  - Can use that data to inform future content

- What can we do with all that data?
  - What types of questions can we answer?
  - How does it affect our business model?

- How do we collect all of this data?
  - What are the technical challenges?
  - What are the legal/ethical challenges?
The Rise of Big Data

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The Role of Analytics

- Game development continues after you ship
  - Improvements to expand player base
  - Critical for DLC or in-game items

- Mixture of business and game design
  - How do you keep players playing the game?
  - What do they like? What makes them frustrated?
  - This is the new direction of game design

- Breaks down into three categories
  - Categories determined by data complexity
Player Activity Analytics

- Data for a single player
  - Or for a given player group

- Examples:
  - How often do they play?
  - When does the player quit?
  - Can we get the player back?

- Some support from platform
  - Generalities like play time
  - Found in Facebook, Steam
  - Custom solutions for more
Player Activity Analytics

Farmville DAU

- Facebook Eliminates Pre-Game Gift Interstitials
- Christmas and New Year's Dips
- Horse Stable - Promo Starts

0-Nov 19 24-Nov 29-Nov 4-Dec 9-Dec 14-Dec 19-Dec 24-Dec 29-Dec 3-Jan 8-Jan 13-Jan 18-Jan 23-Jan 28-Jan 2-Feb 7-Feb 12-Feb 17-Feb
Game System Analytics

- **Non-spatial game data**
  - Behavior of many players
  - Often the game economy
  - Also issues of game balance
- **Needs custom data gathering**
  - Data tailored to your game
  - And so are the data queries
- **But visualization is easy**
  - Queries *format* is standard
  - Can use existing viz tools
Game System Analytics

- **Example**: Weapon economy in *Eve Online*
Spatial Data Analytics
Spatial Data Analytics

- **Spatial game data**
  - Where are things happening
  - Critical for big MMOs
  - Also useful in level design

- Requires custom solutions
  - Custom data collection
  - Custom data visualization

- Complex tools made in-house by the game studios
  - Only worth it for big games
Player Activity: Funnel Charts

1000 People Clicked on the Ad

880 People Downloaded Client

650 People Created an Account

550 Entered Credit Card

What Happened?

200 Created a Character

180 Played 15 Minutes

1000 People Clicked on the Ad
Funnel Charts and Design

- **Goal**: find “pain points”
  - When does player quit X?
  - Why doesn’t player do Y?
  - Less pain = more accessible

- But do not necessarily want to eliminate them all
  - Easy game = casual game
  - Turns off hardcore players
  - Hardcore players are needed for almost any game (???)

![Funnel Diagram]

- Starts Quest Chain
- Completes 1st
- Completes 2nd
- Creates a Character
- Reaches 10th Level
- Reaches 20th
- Joins Guild
Casual and Core are property of **players**, not the **game**

- Interested
- Casual
- Committed
- Devoted
- Hardcore

- Only Plays Demo
- Weekly Player
- eSports Ranked

## Casual-Hardcore Spectrum
Casual and Core are property of **players**, not the **game**.

Freemium Games

- Interested
- Casual
- Committed
- Devoted
- Hardcore

- Occasional Free Player
- Bought an Item
- Buys a Lot

Game Analytics
Casual and Core are property of **players**, not the **game**

Goal of funnel is to find out how far apart these are
Idea from Web Design: A/B Testing

- Develop two versions of a page
- Randomly show different versions to users
- Track users interact with page
- Evaluate the result with statistics
- Choose the “better” version
A/B Testing in Game Development

- Develop two versions of a game mechanic
- Randomly show different versions to users
- Track users interact with page
- Evaluate the result with statistics
- Choose the “better” version
Game Specific Data

• Funnel charts are typically game specific
  • **What** distinguishes casual from core?
  • Cannot get this from platform specific tools

• This requires **custom instrumentation**
  • Functions called at specific activity
  • Record result of activity … **somewhere**
  • Almost exactly the same as profiling
  • Except that there are no pre-made tools
Logging Game Data

Query 1

Query 2

Query 3
Player Logging: Other Benefits

- **Helping players**
  - Restoring lost items
  - Fixing data corruption

- **Finding cheaters**
  - Did they use an exploit?
  - Is their skill plausible?

- **In-game advertising**
  - But beware selling user data
  - Most states have data laws

- Game is run as a **service**
Gameplay Activity

• Very similar to player activity
  • Custom instrumentation code
  • Put in datastore and queried
  • Only difference is what looking for

• Focusing on game mechanics, not individuals
  • But focus on non-spatial game systems
  • Want systems that can be visualized numerically
  • Generally means resources and game economies
EVE Examples: Titanium

- Shuttles can be reprocessed
  - Can turn back into minerals
  - Can use (for building) or resell these minerals
- Shuttles have a fixed cost
  - What if player is bankrupt?
  - Gives players a fallback
- Puts price cap on Titanium
  - If too much, buy shuttles
  - Do we like this design?
EVE Examples: Weapons

- *Trinity* altered gameplay
  - Changed torpedo mechanics
  - Range was made shorter
  - But rate of fire increased

- But players valued range
  - Torpedos volume dropped
  - Cruise Missiles spiked
  - Similar chart for launchers

- But this not mean that the redesign was a bad idea
Spatial Game Data

• Needed for anything that depends on **location**
  • Identify where players are having difficulty
  • Critical for MMOs, large and persistent worlds
  • **Example**: player death heat maps

• Visualization is much, much harder
  • Spatial representation is particular to your game
  • There are no simple, existing solutions
  • Companies create their own custom tools
Spatial Data: Heatmaps

Zone of Death!
SWTOR Example: Chat Logs

Filter on:
How do I…
SWTOR Example: Chat Logs

Filter on:
- Bug
- Broken

bugged (23)
broken relay (19)relay bugged (10)relay not functional (2)this quest is bugged (3)
SWTOR Example: Player Deaths

Legend:
Orange = group
Green = solo
SWTOR Example: Player Deaths

Legend:
Orange = group
Green = solo

Enemy level - player level
SWOTOR Example: Patrol Paths

Encounter “pull” radius
Challenges of Spatial Data

- There are many 3rd party data analysis tools
  - Data analysis is a major part of running a business
  - Business tools work well for player analysis

- But spatial data is very *game specific*
  - Superimposed onto your game visuals
  - Must integrate into your rendering engine
  - Limited to high-end game companies

- What can an *Indie developer* do?
External Tool Support: Tableau

Hockey Game Session

Shot Timing Profile

Choose Player(s)
- B??
- Bru
- Cla
- Dal
- Eri
- Feh
- Gor
- Gre
- Knu
- Lai
- Lun
- Mod
- Mor
- Nea
- Nis
- №4

Shot Type
- BACKHAND
- SLAP
- WRIST

Shots by Player

Game Analytics
Tableau is Better at Gameplay Data

Game Play Analysis

Character Types

Assassins & Fighters

Damagers & Tanks

Healers

Game Average

KDA

 Avg. Win-Loss Ratio

Highlight Tier
- Tier A
- Tier B
- Tier C
- Tier D

Choose Character
- Aldon
- Alekim
- Angok
- Angust
- Arir
- Atril
- Brybur
- Cereck
- Chyden
- Drasayo
- Eldwori
- Enur
- Faor
- Galler
- Geess
- Ghaia
- Hoet
- Jitin
- Joen
- Kaidekel
- Kelech

Summary Statistics

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<th>KDA</th>
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Summary

• Gameplay analytics are increasingly important
  • Often driven by your business model
  • Crucial for monetized/free-to-play games

• Often break data into different types
  • Player analytics: activity of a player over time
  • Gameplay analytics: game economy and balance
  • Spatial analytics: Locality of behavior in game

• Want to learn more? Take Erik’s class