Lecture 28

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 Graph

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

Dates:
- 19-Nov
- 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
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 (???)
Casual and Core are property of **players**, not the **game**

Casual-Hardcore Spectrum

- Interested
- Casual
- Committed
- Devoted
- Hardcore

**FPS Games**

- Only Plays Demo
- Weekly Player
- eSports Ranked
Casual and Core are property of **players**, not the **game**

Casual-Hardcore Spectrum

- Interested
- Casual
- Committed
- Devoted
- Hardcore

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

Freemium Games
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

1. Log
2. Data Store
3. Query 1
4. Query 2
5. Query 3

Game Analytics
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**

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*Game Analytics*
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…
Filter on:
Bug, Broken

SWTOR Example: Chat Logs
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**

Choose Player(s)
- B??
- Bru
- Cla
- Dal
- Eri
- Feh
- Gor
- Gre
- Knu
- Lai
- Lun
- Mod
- Mor
- Nea
- Nis
- Nm

Shot Type
- BACKHAND
- SLAP
- WRIST
# Tableau is Better at Gameplay Data

## Game Play Analysis

### Character Types

- **Assassins & Fighters**
- **Damagers & Tanks**
- **Hybrid Characters**
- **Healers**

### Highlight Tier

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

### Choose Character

- Aldon
- Alekim
- Angok
- Angust
- Atri
- Brybur
- Cereck
- Chyden
- Drasayo
- Eldwori
- Enur
- Faor
- Garler
- Geess
- Ghaia
- Hoet
- Jitin
- Joen
- Kalidel
- Kelech

### Summary Statistics

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<th>Popularity</th>
<th>Matches</th>
<th>KDA</th>
<th>Avg Kills</th>
<th>Avg Deaths</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