Lecture 28

Game Analytics
The Rise of Big Data

• Big data is changing game design
  • Can gather data form 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

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
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
**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
200 Created a Character
180 Played 15 Minutes

What Happened?
**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 Charts and Design**

- 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

Casual-Hardcore Spectrum

Interested → Casual → Committed → Devoted → Hardcore

Only Plays Demo → Weekly Player → eSports Ranked

FPS Games
Casual and Core are property of players, not the game.

Casual-Hardcore Spectrum

- Interested
- Casual
- Committed
- Devoted
- Hardcore

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

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**
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?

![Graph showing Caldari shuttles and titanium prices over time](image-url)
**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
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

Shots by Player

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

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

Game Play Analysis

Character Types

Assassins & Fighters

Hybrid Characters

Damagers & Tanks

Healers

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
- Garler
- Geess
- Ghaia
- Hoet
- Jitin
- Joen
- Kalidel
- Kelech

Summary Statistics

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Game Analytics
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