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

DAU Chart for FarmVille

Graph showing Daily Active Users (DAU) from 19-Nov to 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
200 Created a Character
180 Played 15 Minutes

What Happened?
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

Game Analytics

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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**

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**Casual-Hardcore Spectrum**

- Interested
- Casual
- Committed
- Devoted
- Hardcore

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**FPS Games**

- Only Plays Demo
- Weekly Player
- eSports Ranked

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

Casual-Hardcore Spectrum

- Interested
- Casual
- Committed
- Devoted
- Hardcore

Freemium Games

- Occasional Free Player
- Bought an Item
- 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
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

Log → Data Store → 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?
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**
Tableau is Better at Gameplay Data
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