Analysis of the Characteristics of Twitch.tv Livestreaming and Content

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Video On Demand vs Live Streaming

- Most online video content is readily available on demand
- What is Video-on-demand?
  - Pre-Recorded
  - Hosted by Server(s)
  - Sends to Requested Users
- A newer, less popular, growing service
- What is Live Streaming?
  - User encodes and uploads
  - Server processes
  - Server sends to viewers
YouTube and Twitch

- Created in 2005
- Second-most popular VoD Website
  - 18.69 percent of downstream traffic in NA (CNET.com)

- Created in 2011
- Most popular Livestreaming Website
  - 1.8% downstream traffic (Wallstreet Journal)
Previous Studies

- YouTube has been thoroughly analyzed
  - YouTube Traffic Characterization
    - Network/hardware requirements
    - Caching content allows for less bandwidth and reduces strain
  - Understanding characteristics… A YouTube Case Study
    - Content analysis
    - E.g. Most common video length is under a minute

- Twitch has fewer published papers
Motivation

- Studies such as these can be instrumental in aiding development of future live streaming sites.
- Room for growth
- Our project provides one such study.
Methodology

User Data
- Demographics
- Preferred content
- Preferred Lengths
- Average Use
- Satisfaction

Content Data
- Total Streams
- Stream Popularity
- Game Popularity
- VOD Length
- VOD Views

Technical Data
- Resolutions
- Bitrates
- Frame Rates
- Key Frame Intervals
Survey

- Used Qualtrics to make survey
  - Display Blocks

- Deployed to CS and IMGD and WPI Grads
  - Gathered 150+ responses

How many hours a week, on average, do you watch YouTube content?
- Never
- 1-5 hours
- 6-10 hours
- 10-15 hours
- 15-20 hours
- 20+ hours

How many hours a week, on average, do you watch Twitch.tv content?
- Never
- 1-5 hours
- 6-10 hours
- 10-15 hours
- 15-20 hours
- 20+ hours
Crawler

- Automation
  - Faster, More Reliable, More Data

- Scrapy
  - Python based
  - Twitch API is RESTful

- Batch File and Windows Scheduler
  - Set a timer
  - Every hour, runs crawler through cmd
Crawler: Crawling

- Requests top 100 streams
- Grabs stream data
- Grabs each channel’s top 100 VoDs
- After it reaches the 100th stream, process repeats
Technical Data

- Input 36 channels every day. (Input screenshot)
- Channels correlate to most and least popular, 245 each.

![Twitch Analyzer Results](image)

- **Bitrate Stability**: Your bitrate looks stable at 3221 kbps with a deviation of ±35.62 kbps.
- **Dropped Frames**: No dropped frames were detected.
- **Keyframe Check**: Your keyframe interval looks good - 1.32s ±0.63 (79.21 frames ±38.07)
- **Stream Availability**
  - United States: Poor
  - Europe: Poor

- **Video Frame Rate**: Your average stream frame rate looks stable at 59 FPS ±2.2.
- **Quality Check**: Your bitrate is sufficient for the resolution and FPS you are using (qual: 0.07).

- **Stream Info**
  - Resolution: 1120x700
  - Frame Rate: 59 FPS
  - Audio: aac, 44100 Hz, stereo, ±16, 132 kbps
  - Total Bitrate: 3443 kbps
  - H264 Profile: Main
  - x264 Preset: veryfast / superfast (estimated)
  - Stream Uptime: 0h 2m 28s
Analysis

- **Survey**
  - Age vs Usage of Twitch and YouTube
  - Device Usage for Twitch and YouTube
  - Preferred Viewing Length for Twitch and YouTube videos

- **Crawler**
  - VoD Length CDF
  - VoD Viewer CDF
  - Total Streamers CDF
  - Game Volatility

- **Twitch Analyzer**
  - CDF Most and Least Popular Bitrate
  - CDF Most and Least Popular Streaming Resolutions
  - Audio Levels of Twitch Broadcasts
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Age vs Usage of Twitch and YouTube

The image depicts a bar chart showing the fraction of people using Twitch and YouTube based on age. The chart is divided into three age groups: 18-22, 23-26, and 27 or over.

- For the 18-22 age group, both Twitch and YouTube usage are high, with Twitch usage slightly higher than YouTube.
- For the 23-26 age group, Twitch usage is moderate, while YouTube usage is significantly lower.
- For the 27 or over age group, both platforms have low usage, with Twitch usage being slightly higher than YouTube.

The chart indicates that younger age groups are more likely to use Twitch and YouTube compared to older age groups.
VoD Viewer CDF

Cumulative Distribution

Views

0 50 100 150 200 250
Game Volatility

Position (Game popularity) vs Time (Days)

- LoL
- Hearthstone
- CS: GO
- Dota 2
- Minecraft
CDF Most and Least Popular Streaming Resolutions

Cumulative Distribution vs. Square Pixels

- **Most Popular**
- **Least Popular**

- 960x540
- 1280x720
- 1920x1080
Twitch is much less known than YouTube
  ◦ Younger generation knows Twitch better than old
  ◦ Both young and old generation know YouTube

Most Twitch VoDs are largely unnoticed
  ◦ 50% of VoDs have less than 8 views

The popularity of games changes unpredictably
  ◦ E.g. Minecraft fluctuates between 3rd and 11th most popular game

There are 2 common resolutions
  ◦ 1280x720
  ◦ 1920x1080
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