

DirecTV Video Quality Rating & Analysis Tool

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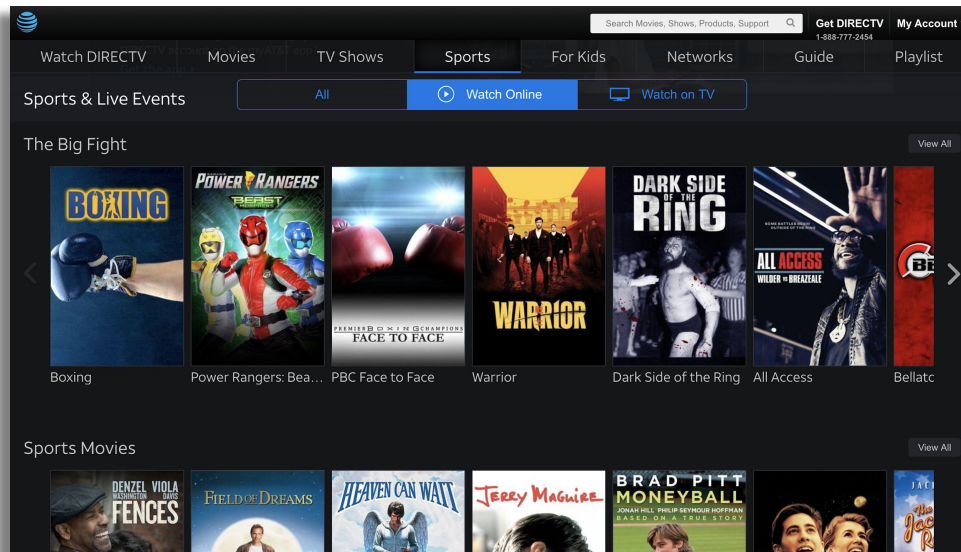
Mark Sargent



AT&T

The Problem

- DirecTV's business model is changing from satellite to streaming services.
- Costs increase per stream depending on the video bitrate.



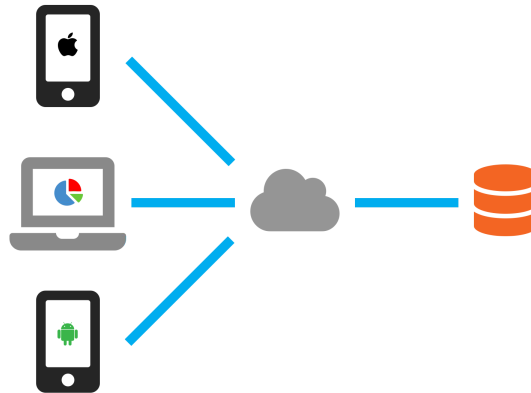
The Problem

- DirecTV's current Video Rating lab cost around \$500,000 in equipment.
 - 4k TVs, 1080p TVs, Amazon Fire Sticks, Special Lighting, Servers, etc.
- The lab could only collect in-person user ratings, one rating at a time.



The Project

- **How can we minimize cost while maximizing video quality?**
- iOS and Android apps collect data on video quality from smartphones, tablets, and Smart TV devices.
- A web app allows for video management and data analysis.
- A Node.js server provides an API to retrieve and send data.
- MySQL database stores video, score, and user information.



Challenges

- Learning Swift, JavaScript, React, Node.js, Kotlin, Git/GitHub, and frameworks
- Preparing for future OS/Software updates
- This project had been worked on for 1 year by Harvey Mudd College
 - Completely reworking database and API from Firebase (non-relational) to MySQL (relational).
 - Redesigning UI to become more intuitive and faster to use.
 - Refactoring code to implement good design patterns and unit testing.

iOS App

- The purpose of the app is to rate two videos with the same content but different video properties to see which users prefer
- This data is sent to a database



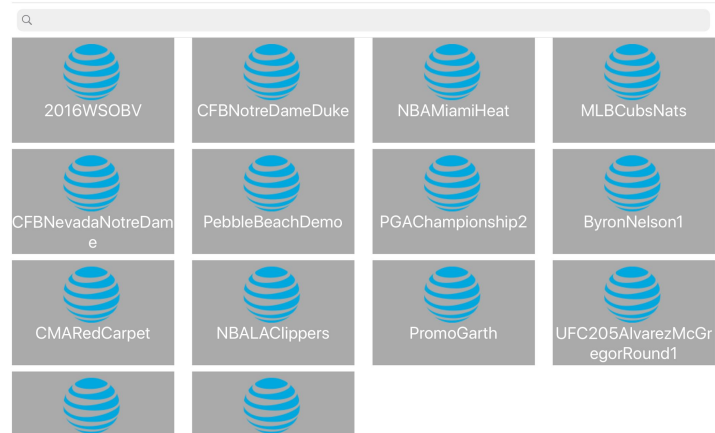
iOS App : What we did

- iOS app was functional, but was difficult to use and certain features weren't working as intended.
- We worked with our liaisons to determine required changes:
 - User friendly buttons
 - Displaying scores results
 - Keeping user score
 - Added thumbnails to video selection page
 - Changed application flow
- Additional "Absolute Rating" application.

iOS App

Before

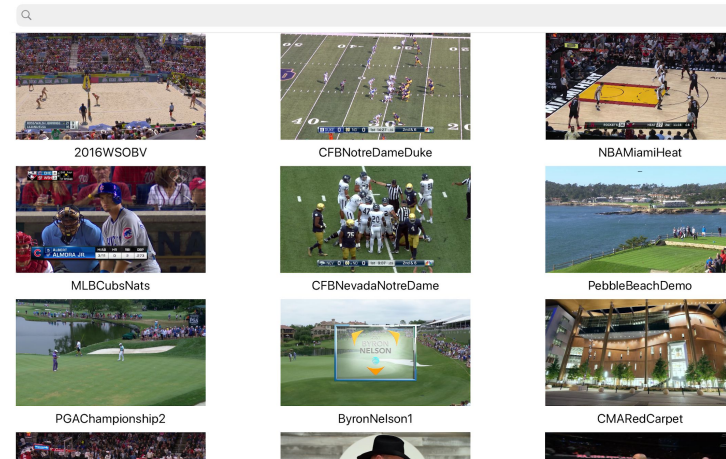
Choose a test collection:



[Back](#)

After

Choose a test collection:



[Back](#)

Daniel Ramirez

iOS App

Before

Select which video is better:

A maybe A same maybe B B

Optional: Reasons for better video

Vivid colors Smoother Video
Lower Contrast Less Noisy
Higher Contrast More detail

Watch again

Done

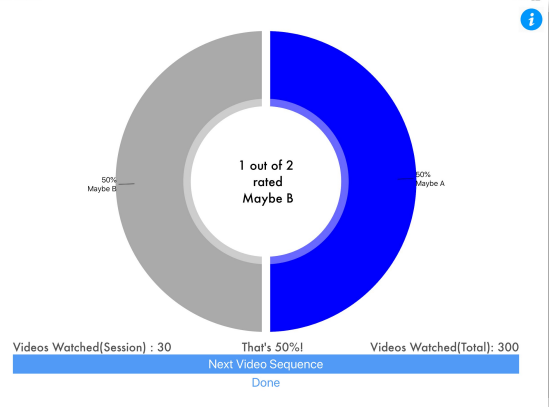
Select which video is better:

Definitely A Maybe A About the Same Maybe B Definitely B

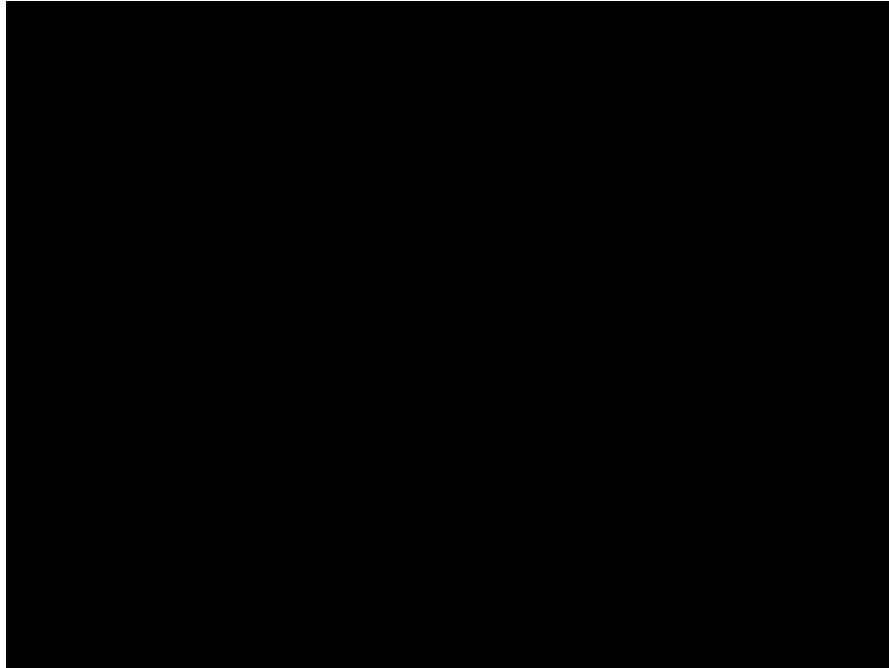
Choose Choose Choose Choose Choose

Watch again

After



iOS Demo



Android App

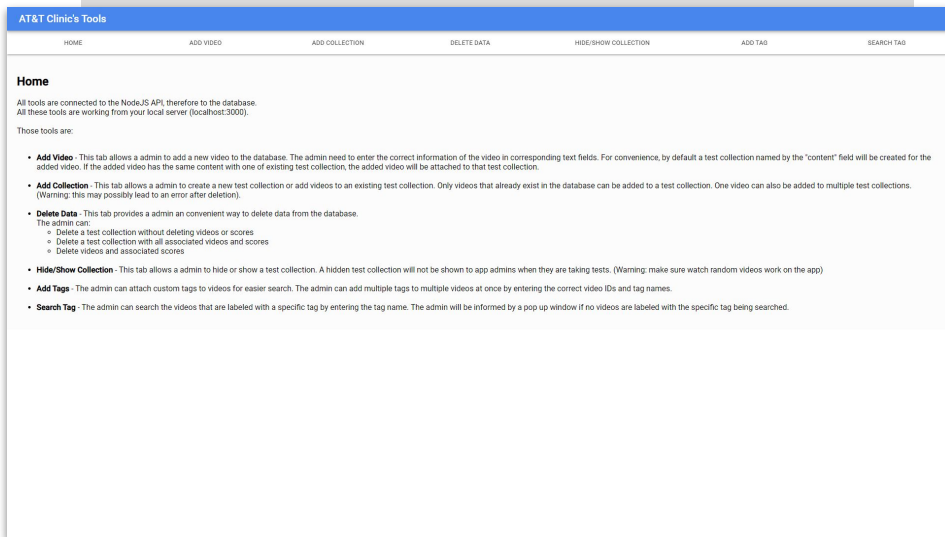
- Android app had not been developed, but was planned as a stretch goal
 - Expand user reach
 - Easier distribution and able to install on TV devices
- Planned to have the same design as the iOS app
 - Include optimization for Android TV devices (Chromecast, Firestick)

Web App: Introduction

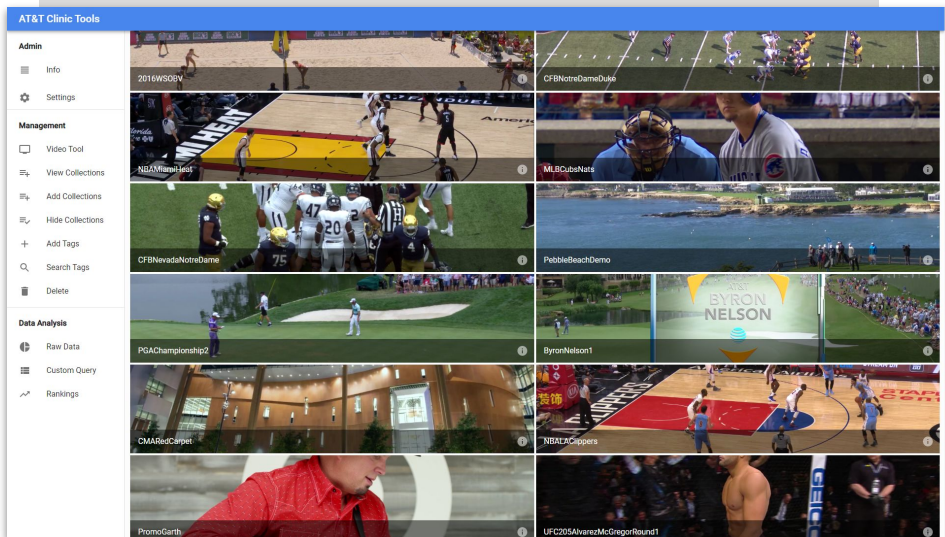
- Dashboard to manage videos, collections, and settings for the mobile app
- Web app was half-functional
 - Difficult to use video management system
 - Issues with the tab bar
 - No data analysis pages
- We worked with our liaisons to determine required changes
 - Expandable sidebar
 - Additional pages for data analysis and raw data viewing
 - Update user-interface for video management to be easier to use
 - Settings page to toggle system-wide settings on mobile applications

Web App: Improved User Interface

Before



After



Web App: Additional Admin Tools

Video Tools

AT&T Clinic Tools

Admin

Info

Settings

Management

Data Analysis

Video Tool

Video general details

Video Name *

Video URL *

Video Type

Collection Name *

Video resolution details

Video original width *

Video original height *

Output Resolution Width *

Output Resolution Height *

Video settings details

Color Space *

Video bitrate *

Video framerate *

Video Tags

Tags *

Custom Query

AT&T Clinic Tools

Admin

Info

Settings

Management

Data Analysis

MySQL Query:

Run

Response

ID	User name	First video	Second video	Score	Device	Mirroring	Brightness	Rewatch	Notes
1	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	1	iPhone8	0	1	0	
2	pesh2	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	-1	iPadPro 212.9	0	1	0	
3	pesh7	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	-2	iPadPro 212.9	0	1	0	
4	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadAir 212.9	0	1	0	
5	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadPro 212.9	0	1	0	
6	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadPro 212.9	0	1	0	
7	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	-1	iPhonePro 212.9	0	1	0	
84	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadPro 212.9	0	1	0	vivid
8	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	1	iPadPro 212.9	0	1	0	noisy
9	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPhone11Pro 212.9	0	1	0	smooth
10	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPhone11Pro 212.9	0	1	0	
11	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadPro 212.9	0	1	0	
12	pesh	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadAir2 212.9	0	1	0	
13	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadAir2 212.9	0	1	0	
14	pesh99	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadPro 212.9	0	1	0	vivid,noisy,smooth
15	pesh8	LZiOnozkAaniJpa1uk	LZiOnozkAaniJpa1...	0	iPadPro 212.9	0	1	0	vivid,noisy

API & Database

- Originally implemented with a Firebase (Non-Relational) database
- Client was “not convinced this was the best way to represent the data”
- Switched to relational database using MySQL
 - Completely Refactor API
 - Write script to convert data from the Firebase database into MySQL insert statements
 - Easily able to access and analyze more data than before
 - Able to run custom SQL queries