Video Categorizer with AI
Case Study

Kira Hartlage

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Introduction

Setting the stage

1. Overview
2. Problem Definition
3. Users & Audience
4. Roles & Responsibilities
5. Scope & Constraints

Overview

Create an internal tool that allows a major TV network to tag and categorize their content.

Problem Definition

WUX1, a national major TV network is struggling to get its digital platform off the ground. Currently, it has an app in the works, but it has so much content that it's hard to categorize.

Instead of spending 3 billion dollars to hire 50 workers dedicated to watching content and categorizing it, they want your team of UX experts to leverage AI to help them save some cash.

Users & Audience

- *Users*
  - *WUX1 employees*
  - *Freelance or contract employees*
- *Audience*
  - *WUX1 employees will use the internal tool*
  - *Viewers of WUX1 videos will benefit from the tool*

Users - Empathy Mapping

Who is the person for this map?

Bert Livingston

Bert is an aspiring screenwriter with a passion for film and TV and recent film school grad. To support himself, he waits tables and works as a content organizer for WUX1. He enjoys watching content for WUX1 because he believes it makes him a better writer, but it can be tedious work at times.

Pains

- Financial uncertainty.
- Worries that he could be replaced by a computer.
- Also feels that a computer lacks the human understanding necessary to truly understand cinema.
- The current method of categorizing film/tv feels tedious.

Gains

- Hopes to catch his big break soon.
- Feels that watching movies for WUX1 makes him a better writer.
- Feels that being paid to watch movies and tv shows is a pretty sweet gig.
- Enjoys being able to work from home.

Bert Livingston

Sees

What do they see around them? In the market? In the media?

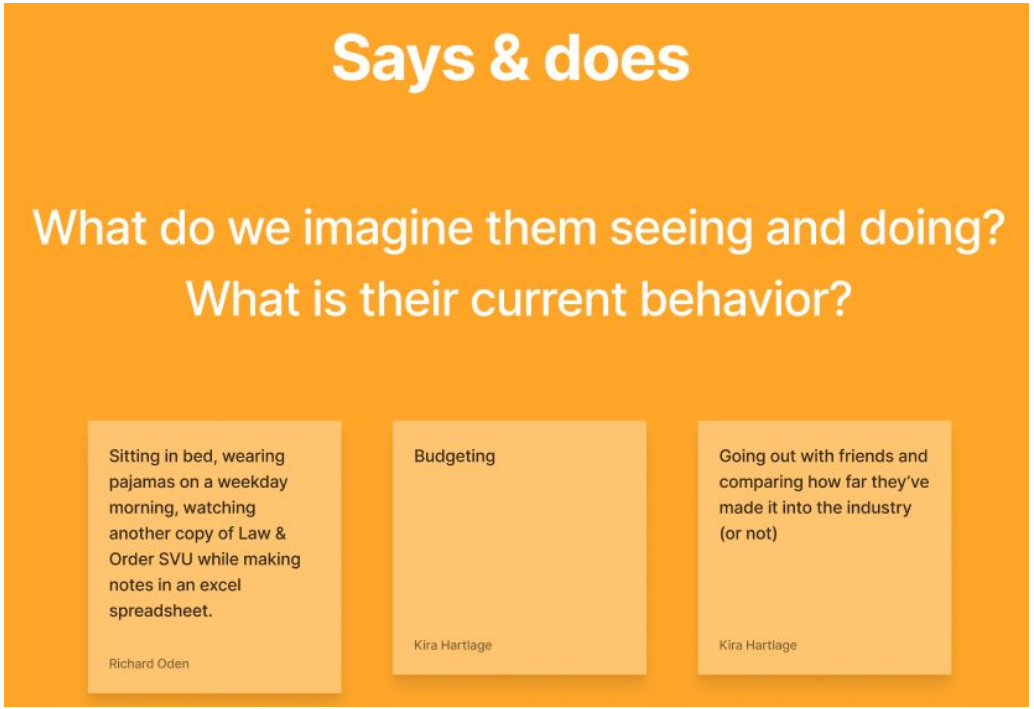
- Success stories of other directors and screenwriters his age. — Richard Oden
- Only positive news from friends on social media. (no one shares their struggles, so it appears everyone is doing better than him.) — Richard Oden
- News about an economic downswing and raising costs — Kira Hartlage
- Increase in streaming services, cable packages, satelite, etc. — Kira Hartlage
- Add text
- Add text

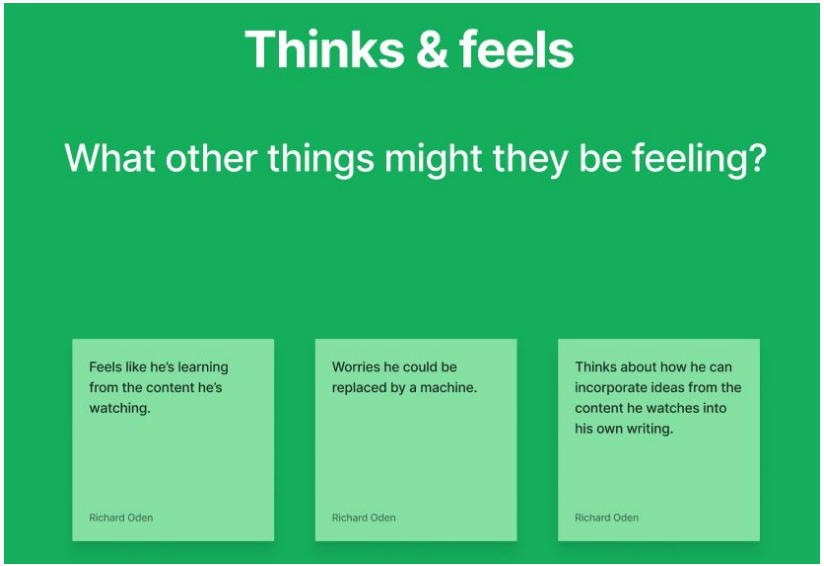
Hears

What are they hearing from others?

- From his family, "When are you going to get a real job?" — Richard Oden
- Hears that upper management is talking about using machine learning to improve their content organization. — Richard Oden
- From friends, "Your job is too easy. How can they pay you to just watch videos?" — Kira Hartlage

Bert Livingston





Users - Empathy Mapping

Who is the person for this map?

Susan Fischer

Susan is in charge of the content organization effort at WUX1. Under pressure from higher ups to reduce costs and increase output, she wants to leverage ML to improve their productivity. As WUX1 is a pretty small company, she's forced to wear many hats. She needs to be able to quickly and easily assess how the project is going.

Pains

- Super busy and stressed out
- Not that knowledgeable of ML.

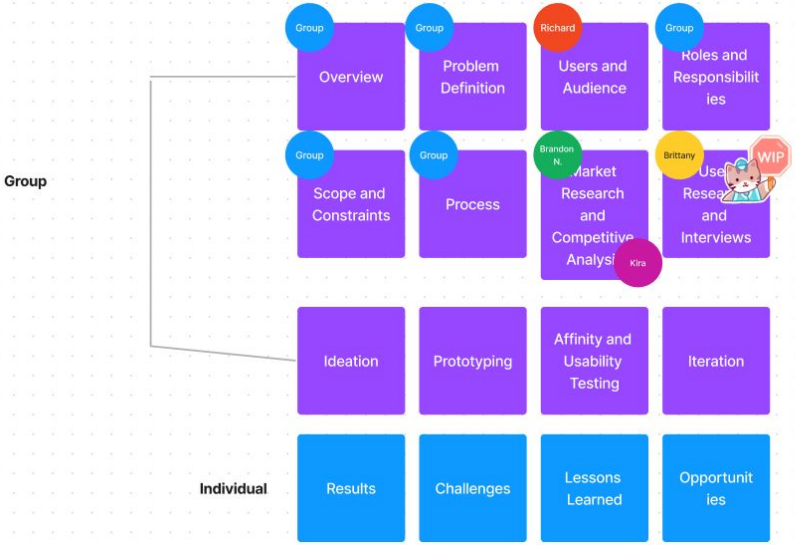
Gains

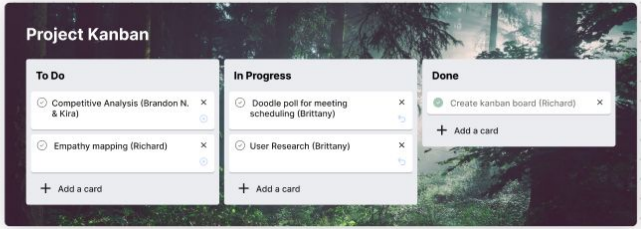
- Enjoys the diverse challenges of her job.
- Hopes that by achieving what's being requested by upper management, she'll be looked upon favorably come bonuses.

Susan Fischer

Roles & Responsibilities

- *Richard Oden took the lead of team meetings and user empathy mapping.*
- *Brittany Bell took the lead for user research.*
- *Brandon Norton researched how streaming services solve this problem of video categorization.*
- *I researched competitors in the AI tools and services space - focusing on image and video recognition.*
- *Together, we brainstormed ideas and ideated based on our research findings.*





Scope & Constraints

- *Since we are working for a fictional company, there are no internal users to interview or observe.*
  - *We interviewed people we know instead.*
- *We were given limited time to work on the project.*
  - *We were not assigned the project until 4 weeks before the end of class.*
- *We're amateurs at UX.*
- *Scheduling issues*
  - *Team members in different time zones.*
- *Problem statement includes a use of AI that we could not find evidence that it exists or is possible.*

Process

What happened, and why

1. Market Research & Competitive Analysis
2. User Research & Interviews
3. Ideation
4. Prototyping
5. Affinity & Usability Testing
6. Iteration

Market Research & Competitive Analysis

- *Who else has this problem?*
  - *Other TV networks with apps*
  - *Streaming services*
    - *Netflix, Hulu, Disney+, ESPN+, Prime Video, YouTube TV, Apple TV*
- *What other solutions are out there?*
  - *Paying people to watch videos and fill out Excel sheets with details, categories*
  - *Have users who watch the videos fill out a survey after they finish watching a video*
- *Who is using them?*
  - *TV critics*
  - *Employees*
  - *Regular people*

Market Research & Competitive Analysis

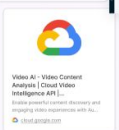
- *How are they performing?*
  - *Netflix has too many microcategories!*
  - *Costs a lot of money*
- *What are their flaws?*
  - *Takes manual effort of watching videos in real-time which is expensive and requires a lot of people*
- *Where are the opportunities for this solution?*
  - *Speeding up the categorization by not requiring individual people to watch them*
  - *Improve AI categorization by using human feedback*

Competitive Analysis of AI Tool & Service Providers

Competitive Analysis

Competitors

(AI Tools for Images and/or Video)

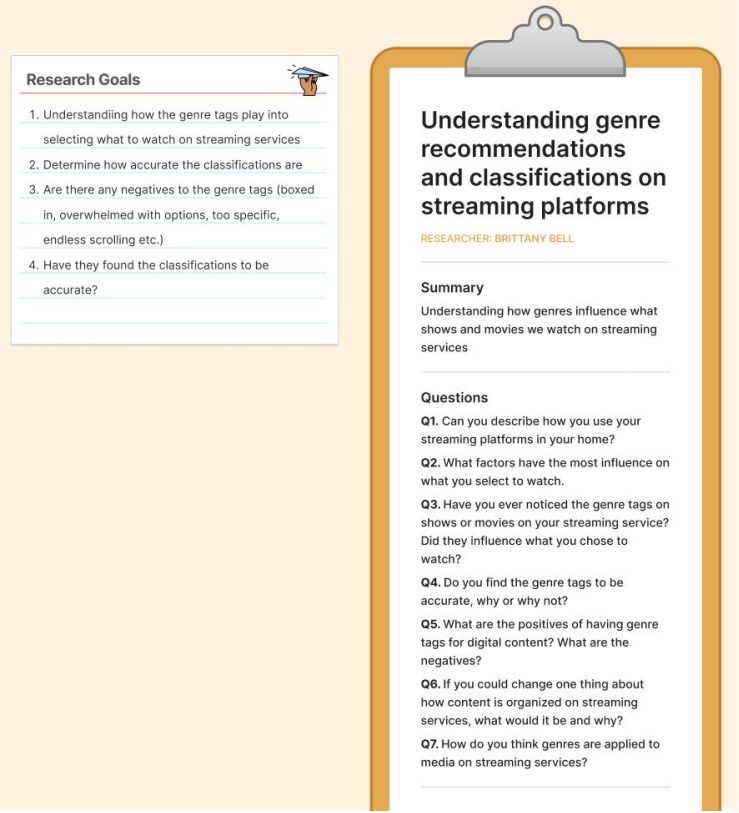


SWOT Analysis

Company/ Brand	Strengths	Weaknesses	Opportunities	Threats
Superb AI	• able to automate labeling at scale • offers support when you need help • manages data, models, and labelling (one complete package) • they can create a custom solution for you	• can identify images within a video but I don't think it can categorize an entire video • would probably need to pay at the enterprise level	• be able to identify a category based on all of the images identified from within a video? • doesn't work with audio	• human support would be nice, by creating an internal tool there's nowhere to turn for more expert help
dotData	• offers AI automation services • used in existing industries • goal is to make easy to use tools	• doesn't look like they've worked with media companies before	• can expand to more markets and industries as they focus on making easy to use generic AI tools	
Google Cloud Video AI	• used by CBS interactive to generate video metadata • has pre-trained ML models that recognize images in streaming videos • "Gain insights from video in near real time using streaming video annotation and trigger events based on objects detected."	• looks like mostly DIY with their tools, I don't know how much support they offer (there are training guides)	• they store the video while analyzing it? • sounds costly	• this seems the closest to actual AI implementation that can generate information based on a video
Amazon Rekognition	• can scale based on number of videos analyzed • mentions they can analyze videos • has some models available so you don't have to start from scratch • can detect labels of objects and actions in an image	• not sure if it can categorize a video	• be able to identify a category based on all of the images identified from within a video?	• it can scale with the number of videos that we need analyzed
Azure Computer Vision	• can analyze videos in real time • doesn't store the videos (deletes when finished)	• doesn't train on our data to enhance the underlying model	• "Pull from a rich ontology of more than 10,000 concepts and objects to generate value from your visual assets." 10,000 doesn't sound like enough • if we used our own AI model, we could train and improve on it over time with our own data	

User Research & Interviews

Goal: To understand how genre/category tags for videos affect video viewers



Interview: **Wednesday, November 2 • 10:00**

TV Lover Alex

Married | American

Age: **32**
Education: **M.Eng in Biomedical Engineering**
Status: **Married**
Occupation: **Engineering Management**
Location: **Japan**
Streaming platforms: **Netflix, Hulu, Amazon Prime, YouTube Premium, Spotify Premium**

Background

Alex is from TN, but lived in KY for many years. Currently lives in Japan for work.

His hobbies: watching TV (Netflix and YouTube), video games, traveling with his wife, collecting KPOP albums

He mainly watches: video gamer streams, YouTube creators (Safiya Nygaard, Abroad in Japan), Netflix series (Stranger Things)

Q1

"I mostly use a smart TV in my living room and my cell phone/iPad to watch digital content. I watch stuff at night for entertainment or during the day for background noise while working or doing tasks around the house."

Q2

"Subject matter is the first and most important. I look for something different when watching with my wife. I mostly go for comedies. I will stop at something I've seen before that has a different picture, it catches my attention. If I see a general category that is what I'm in the mood for, I will stop and browse for a bit."

Q3

"I've noticed them before, but they don't really influence what I pick to watch. I will use general categories, like "drama", to filter and browse."

Q4

"Yes, because they are very specific. I think they are accurate because they try to force a certain number of tags onto content. Sometimes it seems like they are making up new ones, and they are super weird and specific."

Q5

"Positives - if they were searchable, it would help filter down exactly what I am looking for. "

"Negatives - If they tag turns off a viewer, when it's not super accurate, they could miss out on something they would have liked. Or the tag could be focused on only the major aspects, missing some nuance. No additional description of how applicable the tag is (what percent it matches)... which would be interesting and allow me to easily pick the perfect thing to watch."

Q6

"I think I would want whole categories able to be removed or minimized, so when scrolling if I see a category I'm not interested in, I could remove it from the view. It would make browsing easier. It would also improve the recommendations I get from the service. I wish I could turn off autoplay... I hate it so much because I can't read about the show without it starting to play."

Q7

"Input of the creator of the media, like YouTube where the creator picks the tags. I don't know if there is an algorithm for any of this. A survey for viewers to assign tags after watching content would be cool but I don't know how much people would participate. Maybe if they give a discount for participation? I would do that."

Insights

Obstacles
- How do you account for personal taste?
- My interests change some times... I need my content to reflect that.
- Make genres "filterable" that would be so helpful!

Neutral
- I'm always going to be overwhelmed with options, no matter what the genres are or how I can navigate through them. I like options but it can be a lot!

Positive aspects
- Genre tags let me easily find things I might like but never thought about watching before.

Feelings

Negative

Frustrated

Critical

Positive

Excited

Fascinated

Pensive

Stimulated

Interview: **Friday, November 4 • 10:00**

Busy Mom Heather

Mom raising 1 boy | American

Age: **31**
Education: **BA in English**
Status: **Married**
Occupation: **Human Resources**
Location: **Kentucky**
Children: 1 **boy (7 years)**
Streaming platforms: **Netflix, Disney+, Paramount+**

Heather is from KY and has lived there her entire life.

Her hobbies: reading and reviewing books, watching TV, hiking, attending concerts and thrifting.

She mainly watches: reality competition shows and comedies. She uses Netflix, Disney+ and Paramount+ for streaming.

Lives with her husband and son. They watch some content together but she also watches some alone.

Q1

"I watch things in the evening in the living room or for background noise. I like watching things before bed on my phone, too."

Q2

"Time restraints and what I feel like watching at that time plays the biggest roles in what I pick. Seeing a familiar actor or actress would also grab my attention."

Q3

"Yes, they influence what I pick a lot! Certain genres, like romantic comedies, immediately grab my attention."

Q4

"They've always seemed accurate to me."

Q5

"Positive - gives you a quqick idea of what it's about without having to read a long synopsis"

"Negative - can't think of any."

Q6

"Disney+ organization is difficult to use and it's hard to find what you are looking for. It's not broken up into definable genres, maybe because they don't have as many. It doesn't specify into categories like "sci-fi" or anything like that. It has minimal filtering that isn't great or easy to find. You have to continually scroll to find anything."

Q7

"Content reviewers probably watch the content and tag it. Or maybe they use reference services like IMDB."

Insights

Obstacles
- Not all streaming services use tags efficiently

Neutral
- I wish I could filter based on the tags

Positive aspects
- I can quickly find a movie to watch based on the tags

Feelings

Negative

Positive

Bashful

Worthwhile

Satisfied

Aware

Thoughtful

Ideation

Brainwriting session as a group:

Richard	Kira	BBell	Brandon N
Taggers should feel that they are valued for their cinema knowledge. Richard Oden	Gamify tagger's input Kira Hartlage	Balance between objective and subjective Brittany Bell	There needs to be a way for tags to be manually added or removed Brandon Norton
Taggers should feel like the machine is aiding them, rather than replacing them. Richard Oden	Separate workflow for loading training data Kira Hartlage	Sometimes genres get annoyingly in the weeds... I don't find it useful, only funny Brittany Bell	

Managers should be able to quickly and easily view reports, see progress.
Richard Oden

Tagger should be able to recategorize videos whenever they disagree with the AI's decision and/or be able to see the ones with low confidence and help the model out by recategorizing

Kira Hartlage

Tagging system needs to balance speed and accuracy

Brittany Bell

It should be easy to distinguish between AI and manually done work in the UI.

Richard Oden

Process for categorizing new videos should be fast and require little human interaction
Kira Hartlage

How long is a good amount of time to watch something to get an idea of what the genre is? Can you be misled? Can a user add more time to watch the clip if they can't come up with a genre?

Brittany Bell

To train model, we could start with a larger amount of temp workers, then taper down as we gain more knowledge.
Richard Oden

Tool could send alerts if it's having a really tough time and needs tagger intervention

Kira Hartlage

Skip pattern or decision tree? If you pick comedy, it wouldn't give an option for war epic?

Brittany Bell

Alternatively, we could try obtain a dataset of TV shows along with their genres, and train the model from that in the beginning.

Richard Oden

Have the (consumer) person watching the video answer questions after viewing the video to help the AI model

Kira Hartlage

Role to review others tags/AI assigned tags

Brittany Bell

Only categorize the most watched videos to save $/ time

Kira Hartlage

Typically, the user should only be shown things that the machine was not that confident about. The user's decisions in these cases would be used to train the model.

Richard Oden

Be able to add new categories

Kira Hartlage

Way to add an explanation/tag as to what led to the classification? Such as... explosion = action?

Brittany Bell

Team up with a streaming service to use what they use

Kira Hartlage

Taggers are typcally not full-time and are not paid a whole lot, so they should feel gratified by their work.

Richard Oden

Tool could create a summary report of how confident it is overall and a breakdown of # of videos in each category

Kira Hartlage

Pop-up for consumers to rate accuracy of genre tags after watching the entire video

Brittany Bell

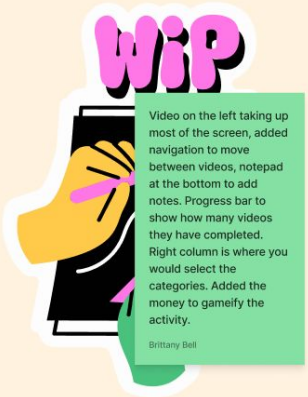
What if a video fits more than 1 category?

Kira Hartlage

Ideation Themes from Brainwriting Session

- Taggers needed to feel valued for their work
- AI should help taggers, rather than replace them but should still be able to distinguish who/what determined the categories
- Tagger should be in control of the categories and be able to modify/add their input to the AI and record notes
- Reports are important for management
- Consumer input is also valuable

Lo-fi wireframe design iterations created individually and reviewed as a group



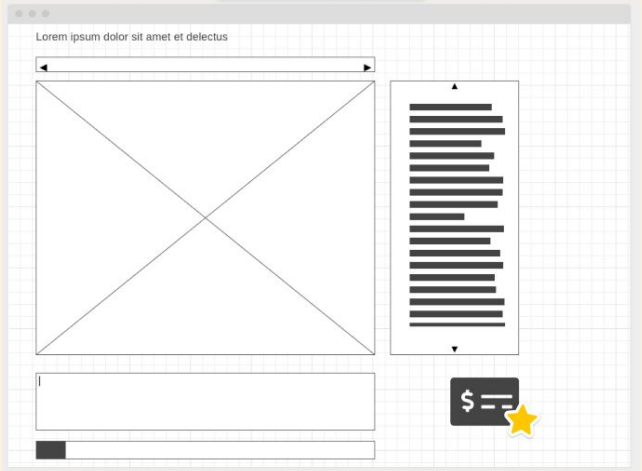
Video on the left taking up most of the screen, added navigation to move between videos, notepad at the bottom to add notes. Progress bar to show how many videos they have completed. Right column is where you would select the categories. Added the money to gameify the activity.

Brittany Bell

Wireframe.cc | The go-to wireframing tool.

A powerful, intuitive app for creating and sharing wireframes.

wireframe.cc



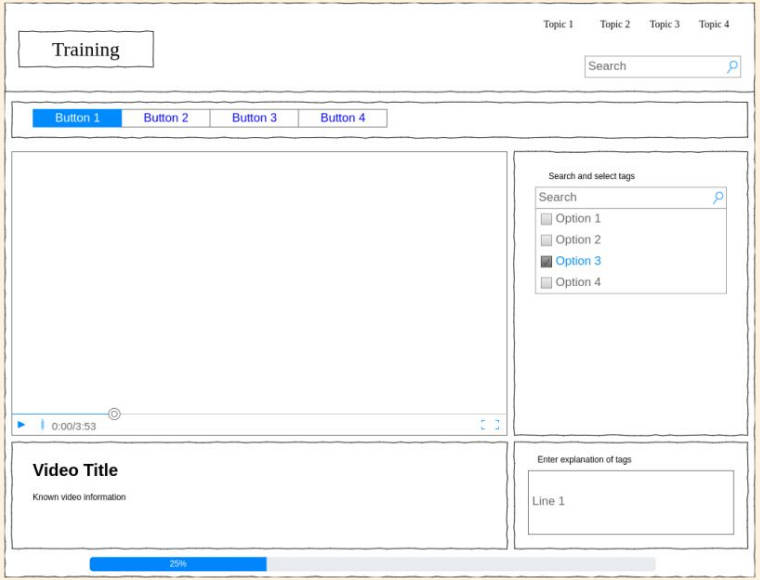
draw.io

Video and progress bar again. You can search and select as many categories as you want.

Brittany Bell

Training model

Brittany Bell



Model predictions

Brittany Bell

The icon symbols are especially good. Summary table page.

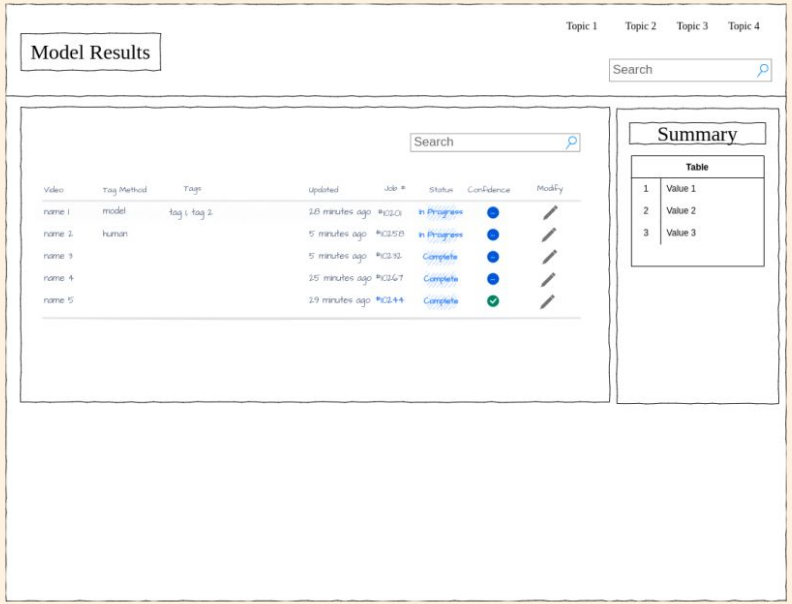
Brittany Bell

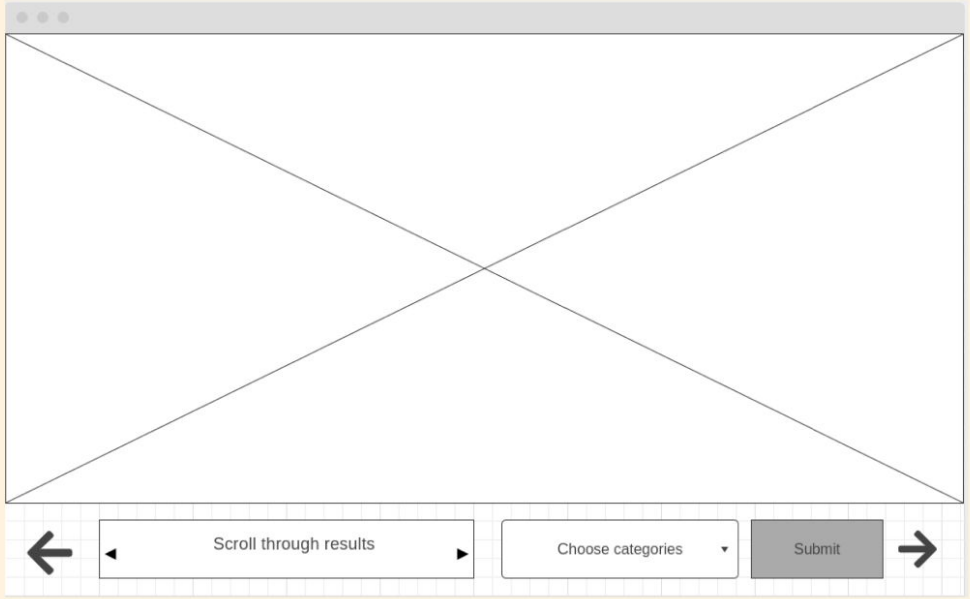
"Theater Mode"

What the employee might see as they review and classify content.

Maybe mobile layout?

Brittany Bell





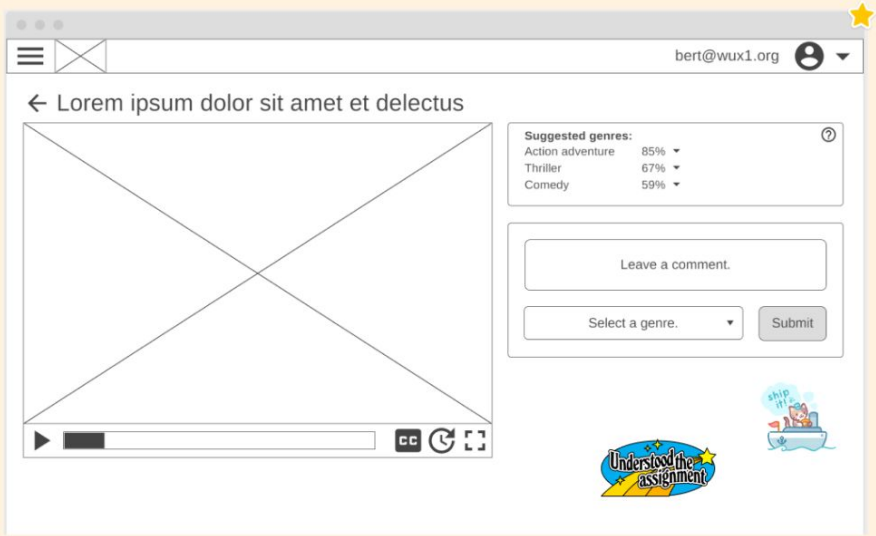
Inspired by video streaming services. Made the video smaller because it's less important. Progress bar and CC added.

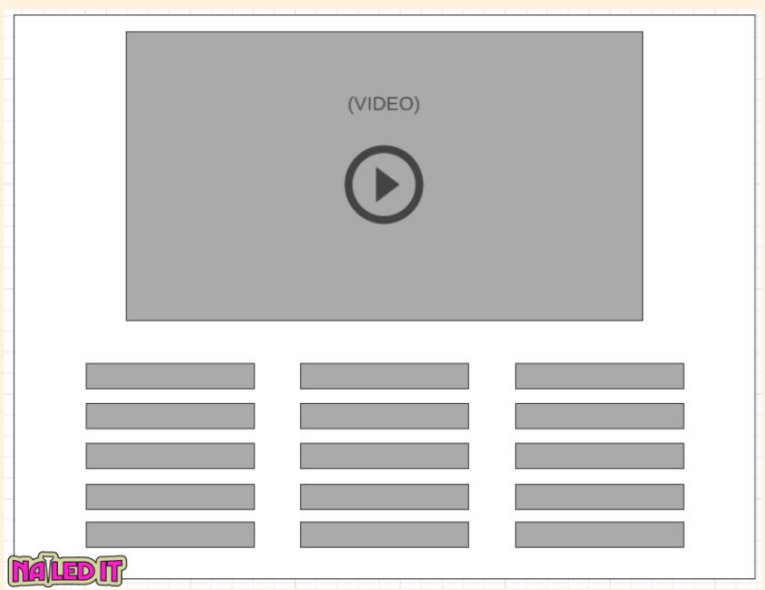
Suggested genres box with confidence, drop down box would explain how the model identified that.

Leave a comment and select a genre boxes. The submit button should auto load the next video. The back button would take you to a list of the videos you need to review.

Maybe adding selecting multiple genres on the drop down?

Brittany Bell





Affinity & Usability Testing

- *How did testing your prototype go?*
  - *We considered our group review of our lo-fi wireframe designs as usability testing. It went well. We had some similar ideas but we also had some unique ideas that we could draw from for our final design.*
- *Where were the pain points?*
  - *Not having real users to test. Since this would be an internal tool, we would need employees from our fictional company to test, but they don't exist. But because those employees could be anyone, we decided we could be the testers.*
  - *We were obviously biased since we also came up with our own ideas. An outside perspective would have offered more diversity and different solutions and features.*
- *What was successful?*
  - *We came up with a long list of great features to include.*
- *What did you learn?*
  - *Collaboration is very important! Diversity of thought and different approaches to solving problems is key to arriving at a good solution.*

Lo-Fi Wireframe Summary

Features we loved:

- Video taking up most of the screen
- Having a full-screen video mode (mobile layout?) and a smaller video model
- CC and speed controls for videos
- Progress bar to show how many videos have been tagged
- Be able to navigate from video to video
- Be able to navigate back to list of videos
- Gamification - showing points or $ that represent videos tagged
- Search for videos
- Search for tags when selecting them
- Select as many tags as you want to
- Separate screens for tagging a video vs. seeing summary of all videos and their tags
- Icon symbols to represent ML tag confidence levels
- Include explanation on why ML chose the tags it did
- Have space for the tagger to leave notes
- Include current login info on top right

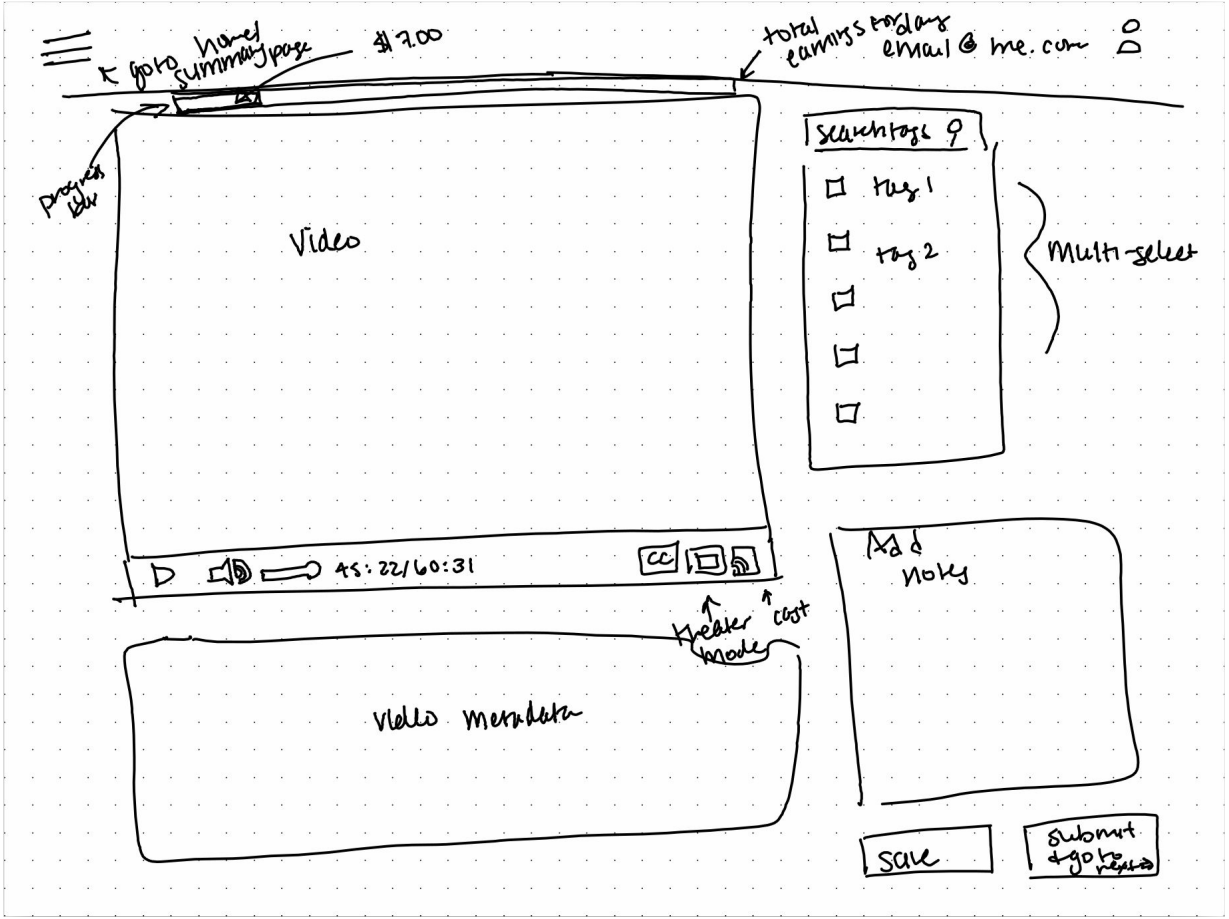
Features we need to address or add:

- Show suggested tags next to video while tagger is watching (could this introduce bias?)
- Auto-load next video when a video is tagged (is that a clear process flow?)
- Use a multi-select drop down (is it obvious that you can select multiple tags?)
- Show all tags on one page under the video (depends if there are too many tags or not, otherwise it might take up too much space; also might be hard to find the tag you're looking for)

Prototyping

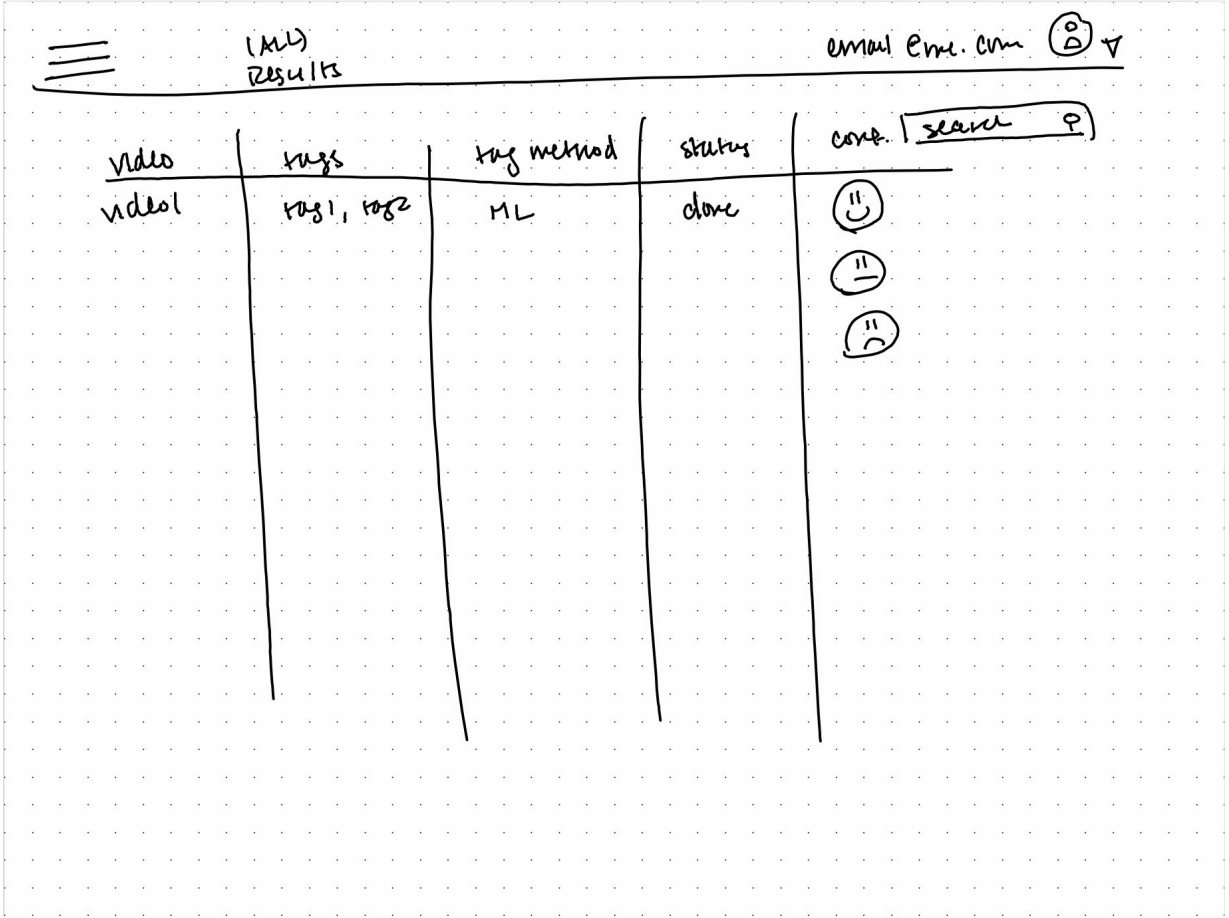
- *How did you approach making your prototype?*
  - *Based on the common features and themes we discovered during the lo-fi wireframing and brainwriting process, I chose what I felt was important for the hi-fi wireframe.*
- *Did you make wireframes or sketches?*
  - *I made a few sketches between the lo-fi and the hi-fi wireframe process*
- *What were the requirements for the prototype?*
  - *The common features and themes we discovered during the lo-fi wireframing and brainwriting process*
- *What challenges did you face while making it?*
  - *Not feeling comfortable with Figma or other tools that are very time-consuming so I continued with draw.io that was more drag and drop.*

Sketches



goto home/summary page
$7.00
total earnings for day
email@me.com
progress bar
Video
45:22/60:31
CC
theater mode
cast
video metadata
search tags
tag 1
tag 2
Multi-select
Add notes
save
submit & go to next

Sketches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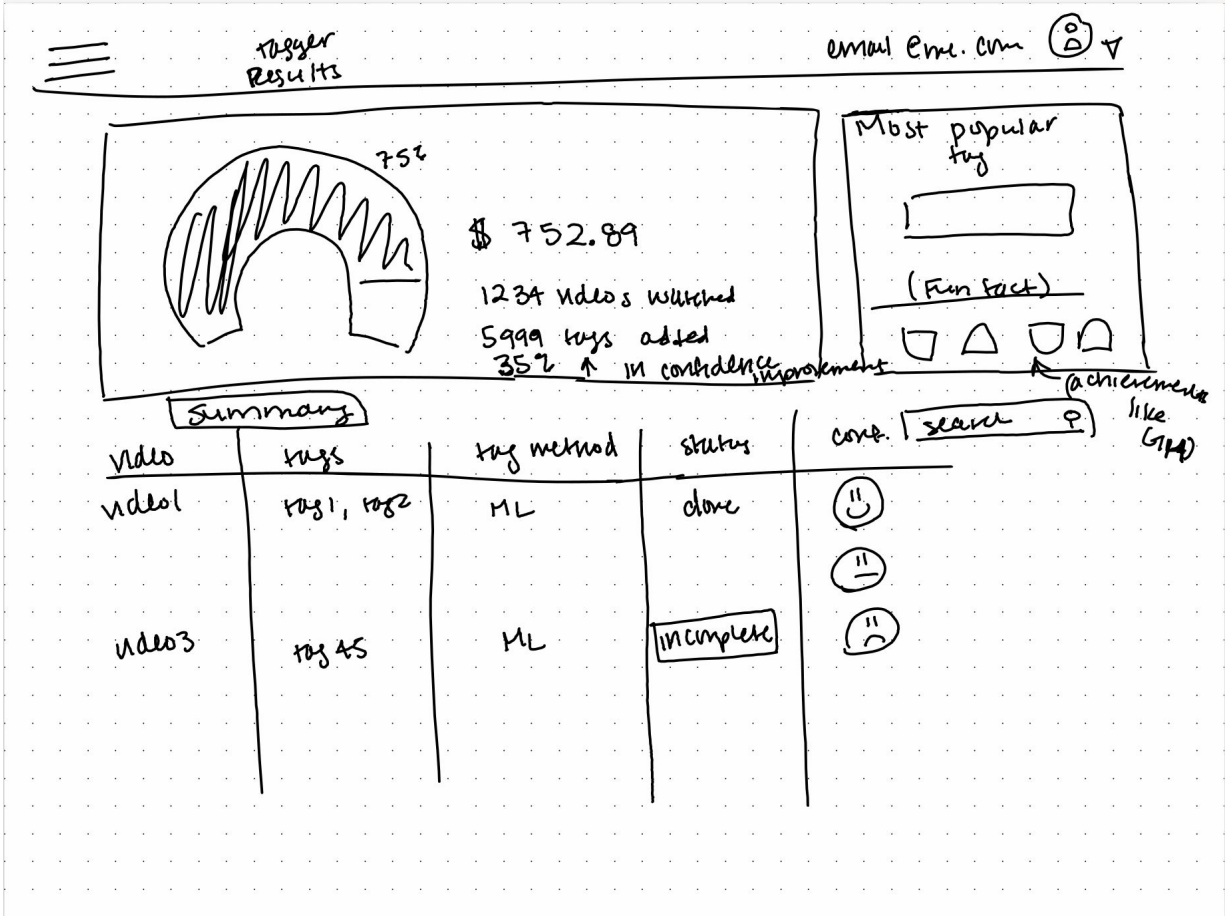
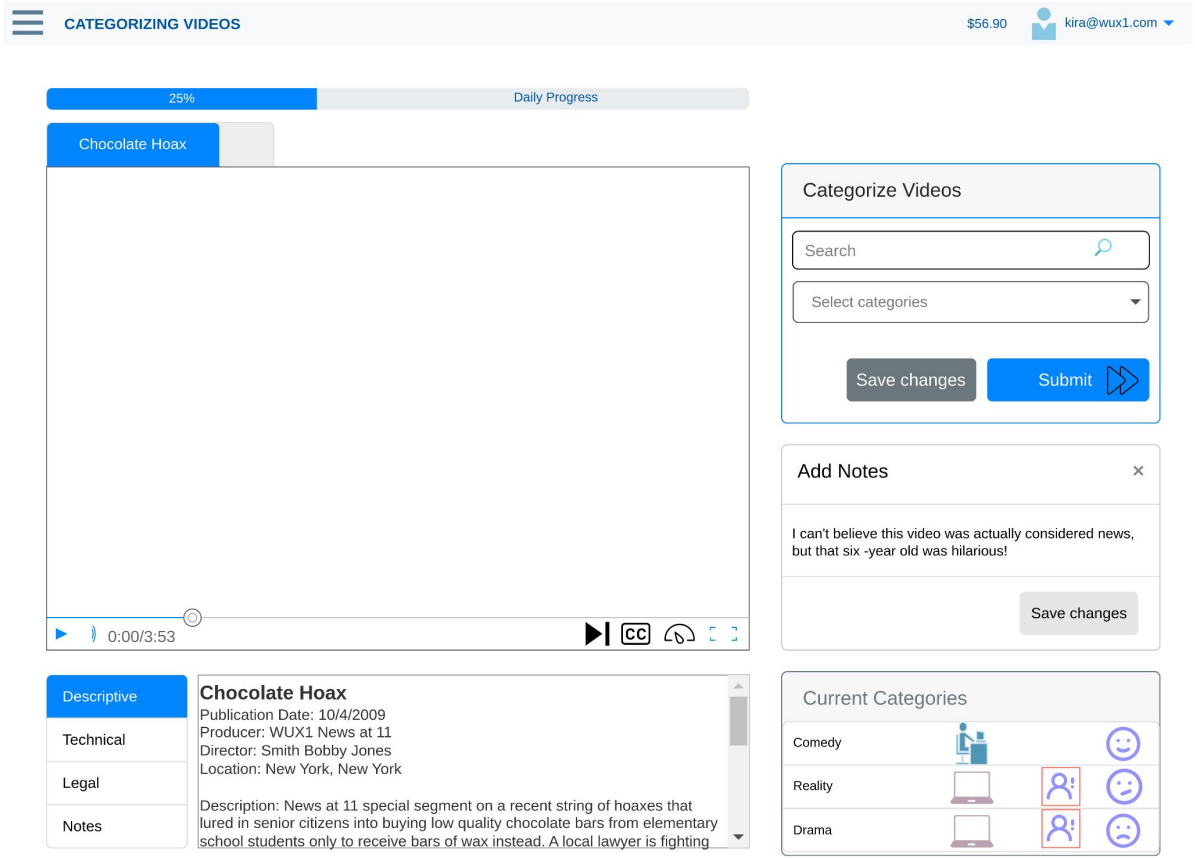
Results
email @me.com
video
tags
tag method
status
conf.
search
video1
tag1, tag2
ML
done

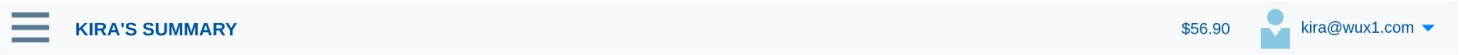
Sketches

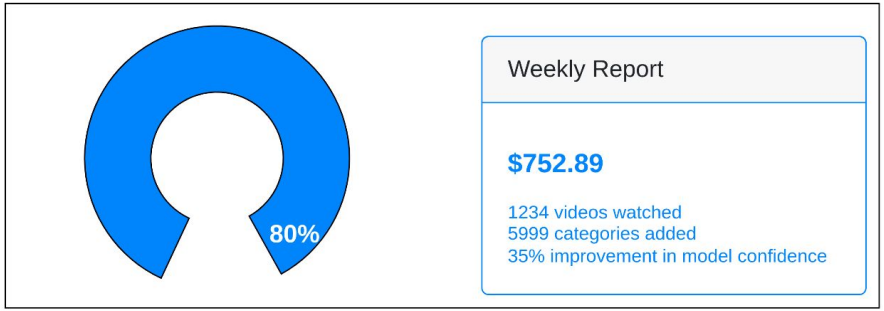

Tagger Results
email ene. com
75%
$ 752.89
1234 videos watched
5999 tags added
35% ↑ in confidence improvements
Most popular tag
(Fun fact)
(achievements like GH)
Summary
video
tags
tag method
status
comp.
search
video1
tag1, tag2
ML
done
video3
tag45
ML
incomplete

Hi-Fi Wireframe (Prototype)



Hi-Fi Wireframe (Prototype)





Video	Categories	Method	Status	Confidence
Chocolate Hoax	Comedy, Reality, Drama			
Next Great Vegan Chef	Cooking, Reality			
The Littlest Tooter	Kids, Comedy			
Too Many Heartthrobs	Reality, Drama, Romance			
Hot Potato	Game, Reality			

Iteration

- *What did you change?*
  - *I did one iteration from my sketch to the hi-fi wireframe. I reorganized where the buttons are and what they do. I also used a drop-down menu instead of showing the categories and having them be checkboxes.*
- *How did you approach making changes? Why did you change those things?*
  - *I decided there would be too many categories to show them all with checkboxes, but with a drop-down you can do multi-select if there are more than 1 applicable category.*
  - *I was also limited in what I could do in draw.io and what free images and icons I could get, so it's not as customized as I would like (especially with color and shape).*
- *What were the results of changing them?*
  - *I think the pages have a better visual hierarchy with what I was able to do with color and headings.*

Conclusion

Where things ended

1. Results
2. Challenges
3. Lessons Learned
4. Opportunities

Results

- *What were the ultimate results of your solution?*
  - *I produced two dashboards - first is what the tagger will be using to watch and categorize the video and the second is their summary/home page where they can see their overall progress and search for videos and see what videos need attention.*
- *Was it successful? Did it fail?*
  - *I wasn't able to build a working prototype or one that is fully personalized to my liking, but I like the feature list that I came up with and how they are presented in the hi-fi prototypes.*
- *Why?*
  - *I ran out of time and wanted to spend my time on the research and coming up with features instead of dedicating my time to figure out how to get a rectangle to look the way I wanted in Figma. I weighed the time vs. learning benefits, and focused my time on the upfront process instead of focusing on the nitty-gritty tool learning.*

Challenges

- *What challenges did you face while creating and testing this solution?*
  - *I did not test the final hi-fi wireframe, but if I had more time I would do usability testing with them and do another iteration. For the testing, I would show the user the wireframe and ask them a few questions like:*
    - *How would you watch the video and decide what categories apply?*
    - *How would you select and save those categories?*
    - *How would you utilize the AI results to help you choose categories?*
    - *How would you edit or add to existing categories?*
    - *How do you proceed to the next video? The previous?*
    - *What do the symbols mean?*
- *What part was hardest?*
  - *Turning the feature list into a prototype*
- *How did you overcome it?*
  - *Tried to silence the judgment and doubt in my head and just try something*

Lessons Learned

- *What did you learn?*
  - *Collaboration is key to getting a variety of ideas*
  - *UX process takes a lot of time and steps*
  - *Iteration is very important to progress the design*
- *What takeaways would you share with others?*
  - *Start early and work together as a team*
- *What will you apply in the future?*
  - *Research, research, research*
  - *Ask lots of questions*
  - *And listen!*

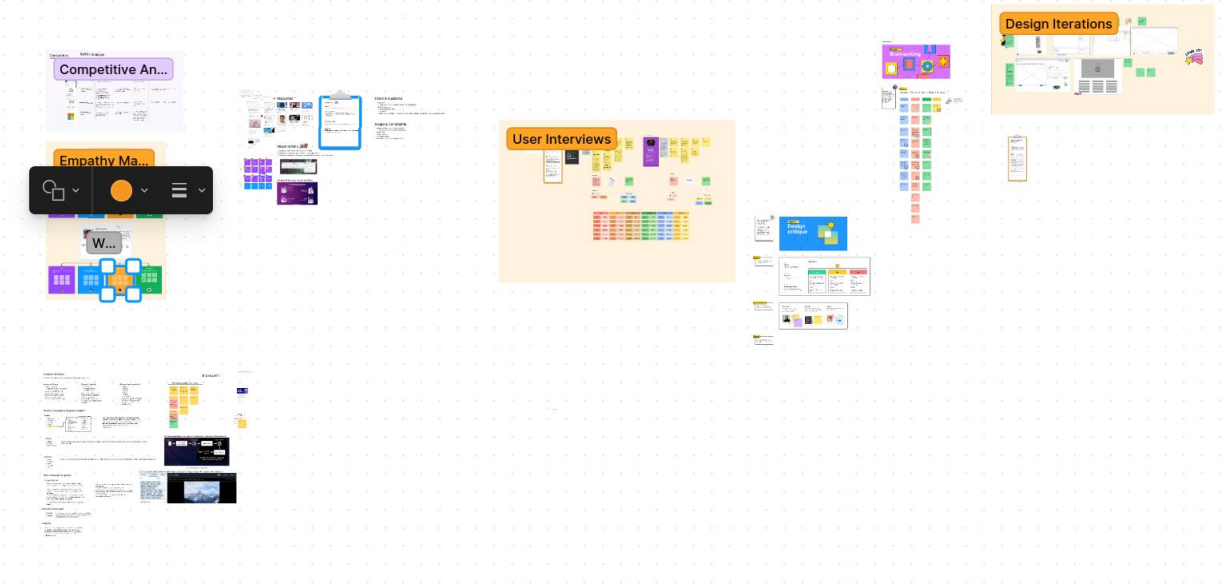
Opportunities

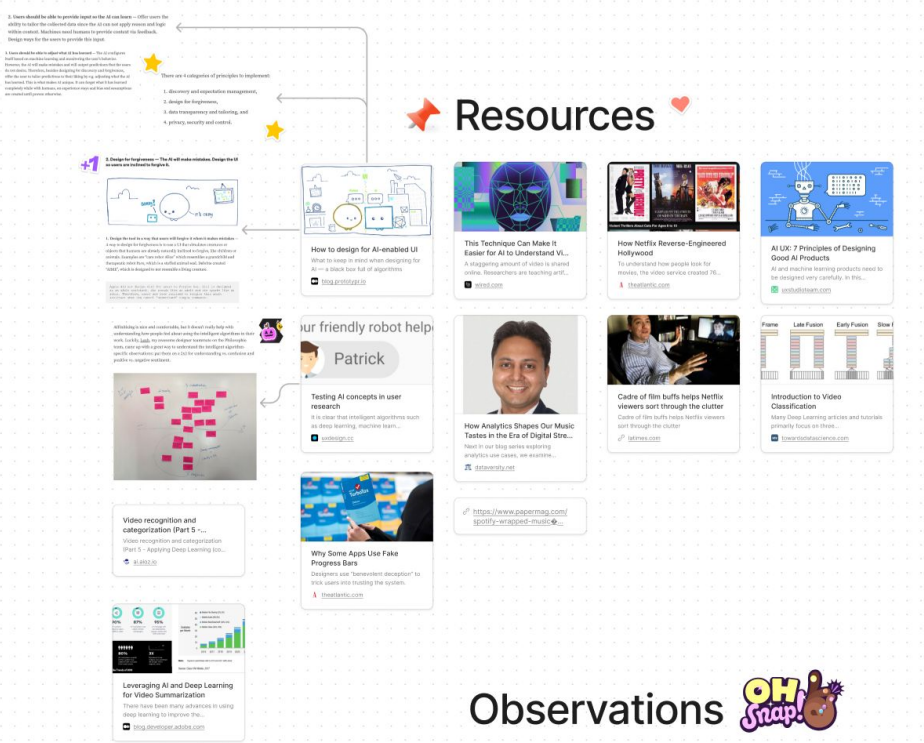
- *What opportunities are still left in this solution?*
  - *Navigation between videos isn't very obvious and might not actually be possible with what I have so far*
  - *The categorizing video page looks a bit busy to me, and I'm not sure the symbols are obvious*
  - *There are no interactions designed - I think mapping these out with what each button does and where it takes you would be a great next step*
  - *I did not make a hi-fi wireframe for one of my sketches that was more of a management view of all of the video results where you can generate reports and export data.*
  - *We also thought we could leverage actual video viewers to help fill out surveys or answer questions about video content on WUX1's video player/website itself to help train or confirm the model.*
- *What would you do differently, if given the chance?*
  - *Fix the opportunities listed above*
  - *Do usability testing on the hi-fi wireframes and do another iteration*
- *If you were moving forward with another iteration, what direction would you take?*
  - *Focus on usability and making sure navigation is intuitive, categorizing the videos is fast and easy, and that the tagger feels appreciated and is having fun while doing it*

Q&A

FigJam

https://www.figma.com/file/N1K5yed46fnPfjYKpYFROP/



Research Links

(can be found on our FigJam)