

NFT Market Data Analysis

Bored Ape Yacht Club
NFT collection

Objective

Identify trends that will help us estimate the current market value of a Bored Ape NFT

What are NFTs?

- NFT stands for Non-Fungible Token
 - Which means this item is unique and cannot be replaced
- Is used as a tool to verify ownership of a digital item/asset
 - Digital items include pictures, songs, movies, etc.
- Utilizes a public ledger so everyone can verify authenticity of the NFT
 - Ethereum Blockchain
 - ERC-751 (contract address, tokenIDs)

Secondary Marketplaces

- NFTs are generally sold on a secondary market
- OpenSea is such a marketplace
 - Is like ebay for NFTs
 - Decentralized (buying and selling mechanics operate via smart contracts)

Bored Ape Yacht Club (collection)

- A 10,000 set collection of NFTs
- Each NFT is associated with a picture of a “Bored Ape”
- Each ape has a unique token ID ranging from 0-9999
- Each ape stems from this smart contract address
 - 0xbc4ca0eda7647a8ab7c2061c2e118a18a936f13d



#2180 [tokenID]
Background: Gray
Fur: Black
Mouth: Bored Unshaven
Eyes: Scumbag
Earring: None
Clothes: Black Holes T
Hat: None

*Red denotes required trait

** Ape above is a **5 Trait**

Bored Ape Yacht Club (collection)

- Each ape also has a unique combination of traits
 - Set of traits for a given ape are randomly generated at mint
- The trait count per ape ranges from 4 to 7
- 4 traits are required (**Background, Fur, Mouth, Eyes**)
- 3 traits are optional (Earring, Clothes, Hat)

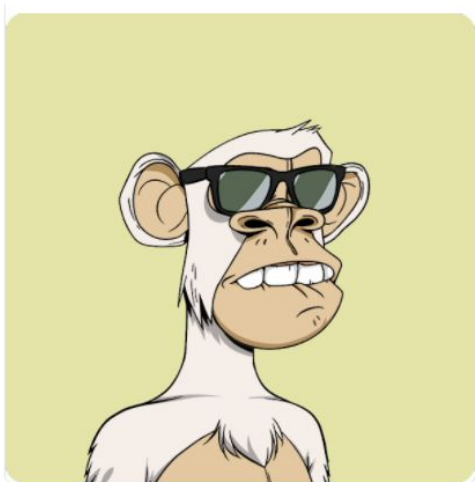


#2180 [tokenId]
Background: Gray
Fur: Black
Mouth: Bored Unshaven
Eyes: Scumbag
Earring: None
Clothes: Black Holes T
Hat: None

***Red** denotes required trait

** Ape above is a **5 Trait**

4 Trait [#8454]



Background: Yellow
Fur: Black
Mouth: Bored Unshaven
Eyes: Scumbag

7 Trait [#2435]

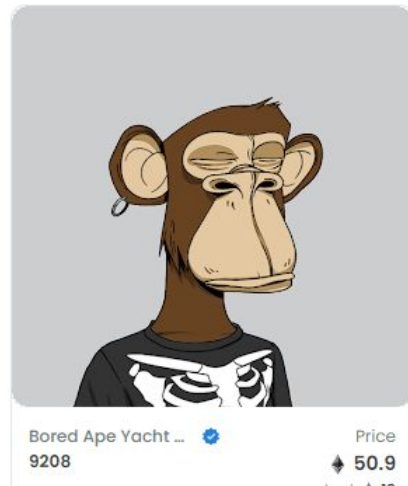
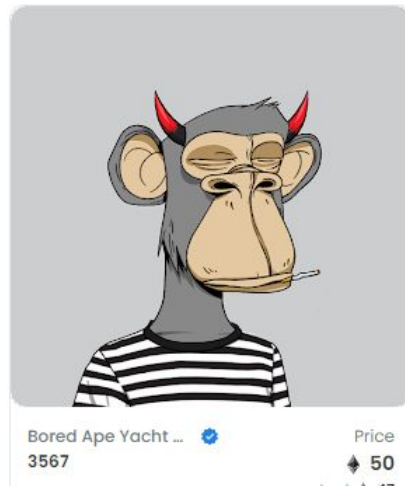
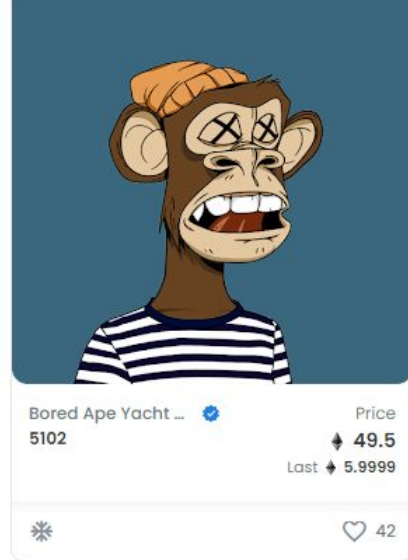
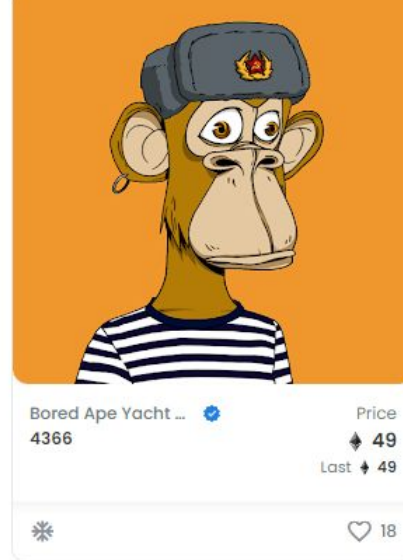
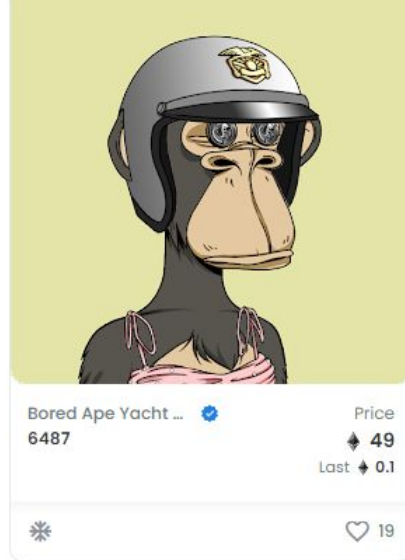


Background: Army Green
Fur: Brown
Mouth: Grin
Eyes: Crazy
Earring: Gold Stud
Clothes: Lab Coat
Hat: Beanie

Dataset

- Extracted data from the OpenSea API (NFT Marketplace)
- Trait data
 - 10,000 x 8
 - Each Ape can be mapped to 8 values
 - tokenID and 7 Traits Categories
- Sales data
 - The list of previous sale prices for each given Ape
- Listing data
 - Listing prices of each Ape currently on sale

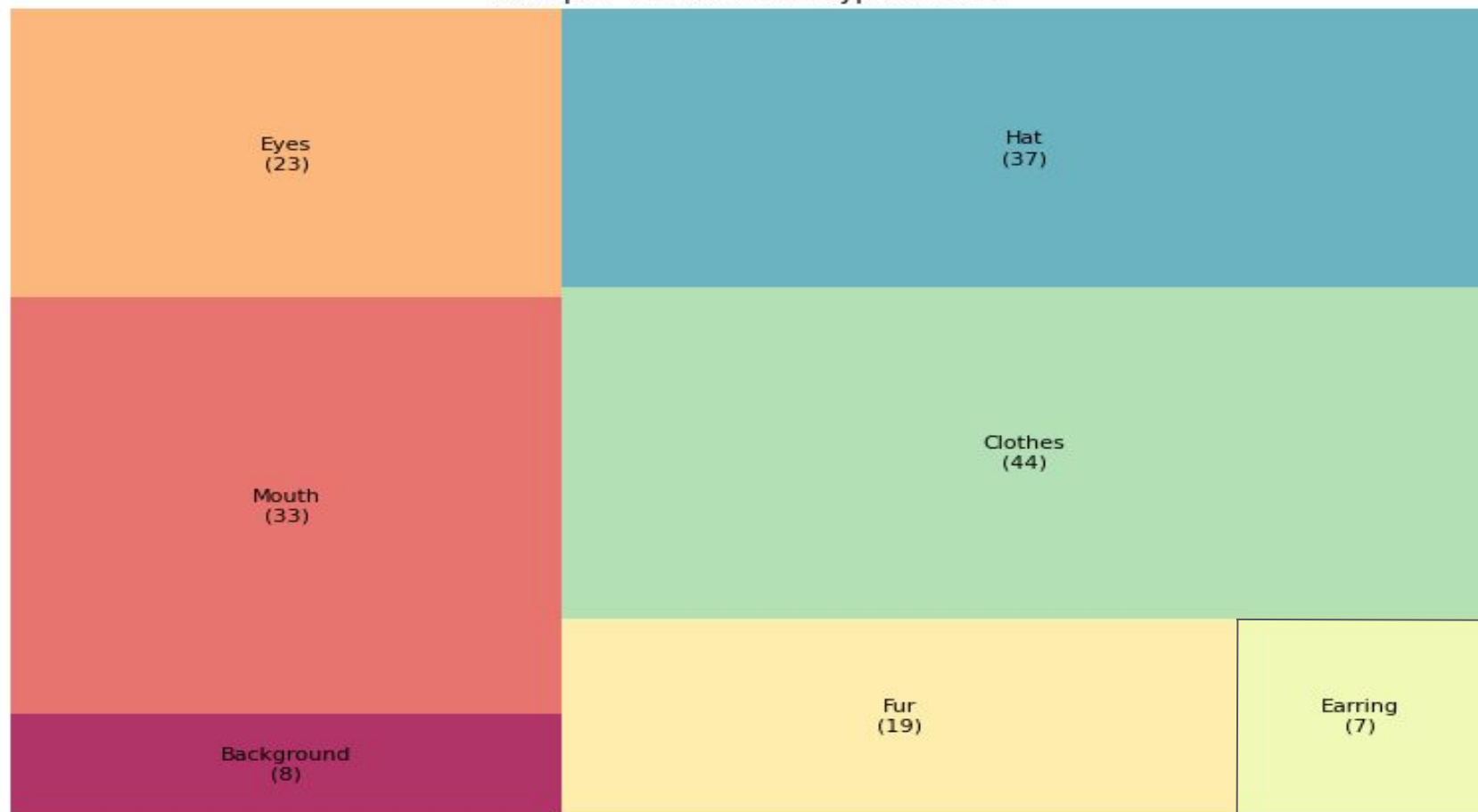
Apes on Sale



Why?

- The past year has seen an explosion in the NFT Market
 - Emerging Asset Class
 - Minimum Listing Price for Bored Apes is \$200,000
- Investment Vehicle / Collateral
 - Decentralized infrastructure which allow for P2P loan
- **Analysis can serve as a helpful tool for investors and collectors when determining current market value**

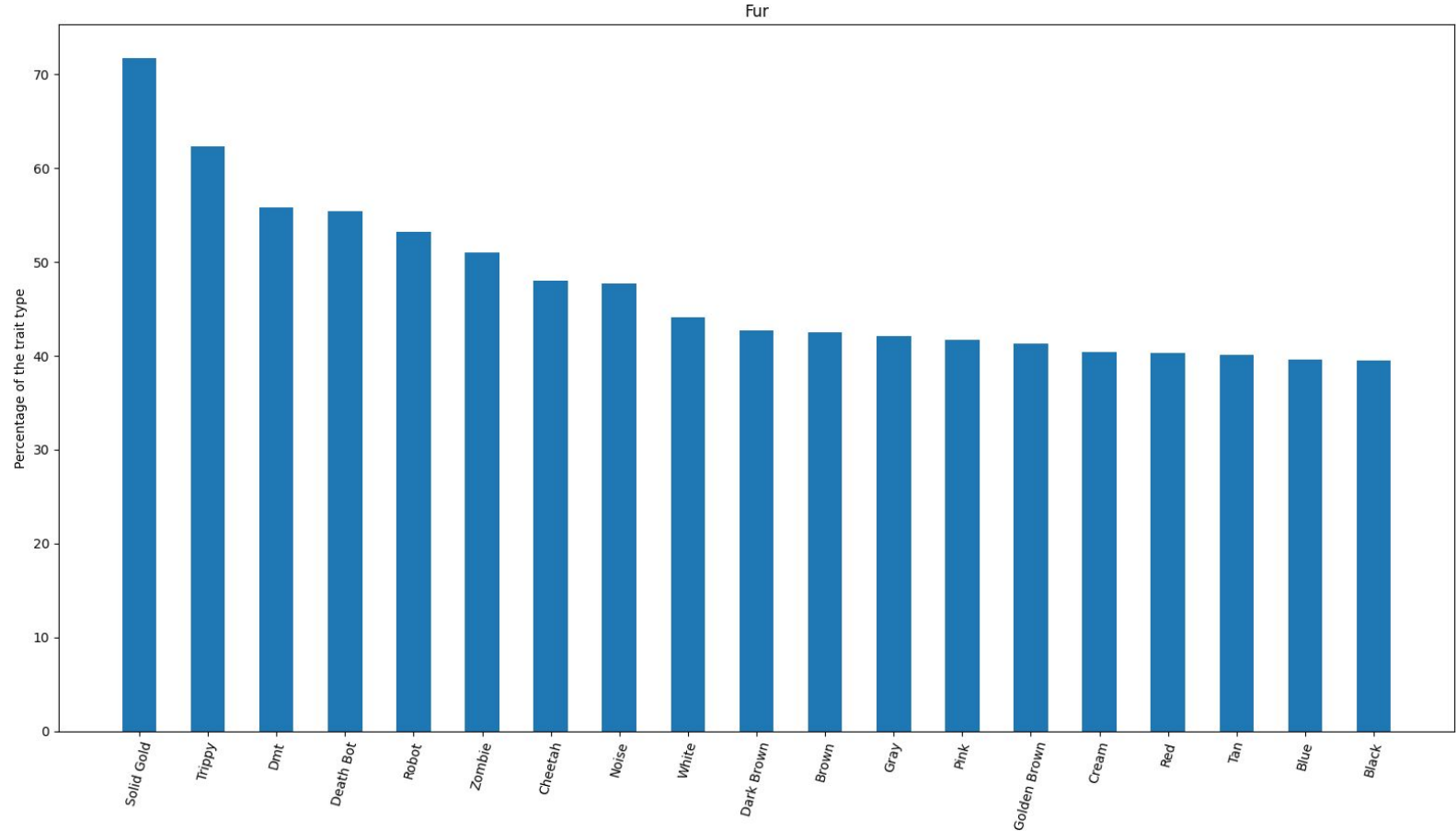
A Map of the number of type of traits



What traits are more desirable than others?

Hypothesis - Least sold traits are most desirable

Percentage of each Fur type that has sold less than 2 times

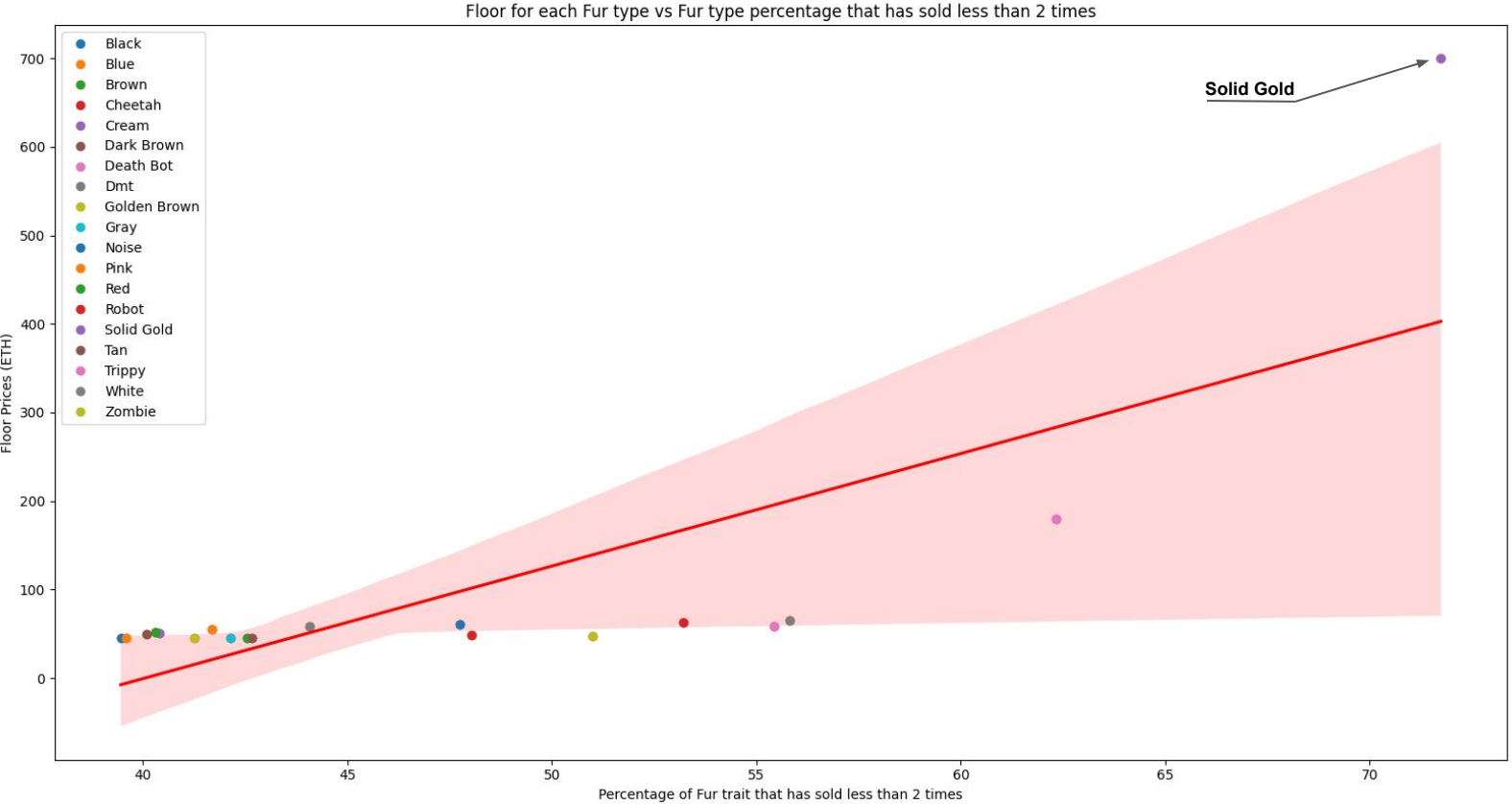


Minimum Listing Prices for each Fur type (Floor Price)

Solid Gold:	699.99 ETH	Tan:	49.696 ETH
Trippy:	180 ETH	Cheetah:	49 ETH
DMT:	66 ETH	Zombie:	48 ETH
Robot:	63 ETH	Gray:	45 ETH
Noise:	61 ETH	Golden Brown:	45 ETH
White	59 ETH	Brown:	45 ETH
Death Bot:	58.49 ETH	Blue:	45 ETH
Pink:	55 ETH	Black:	45 ETH
Red:	51.99 ETH	Dark Brown:	44.89 ETH
Cream:	50.99 ETH		

Floor Price vs Percentage that have sold less than 2 times

$r = .755$ (Strong Correlation)



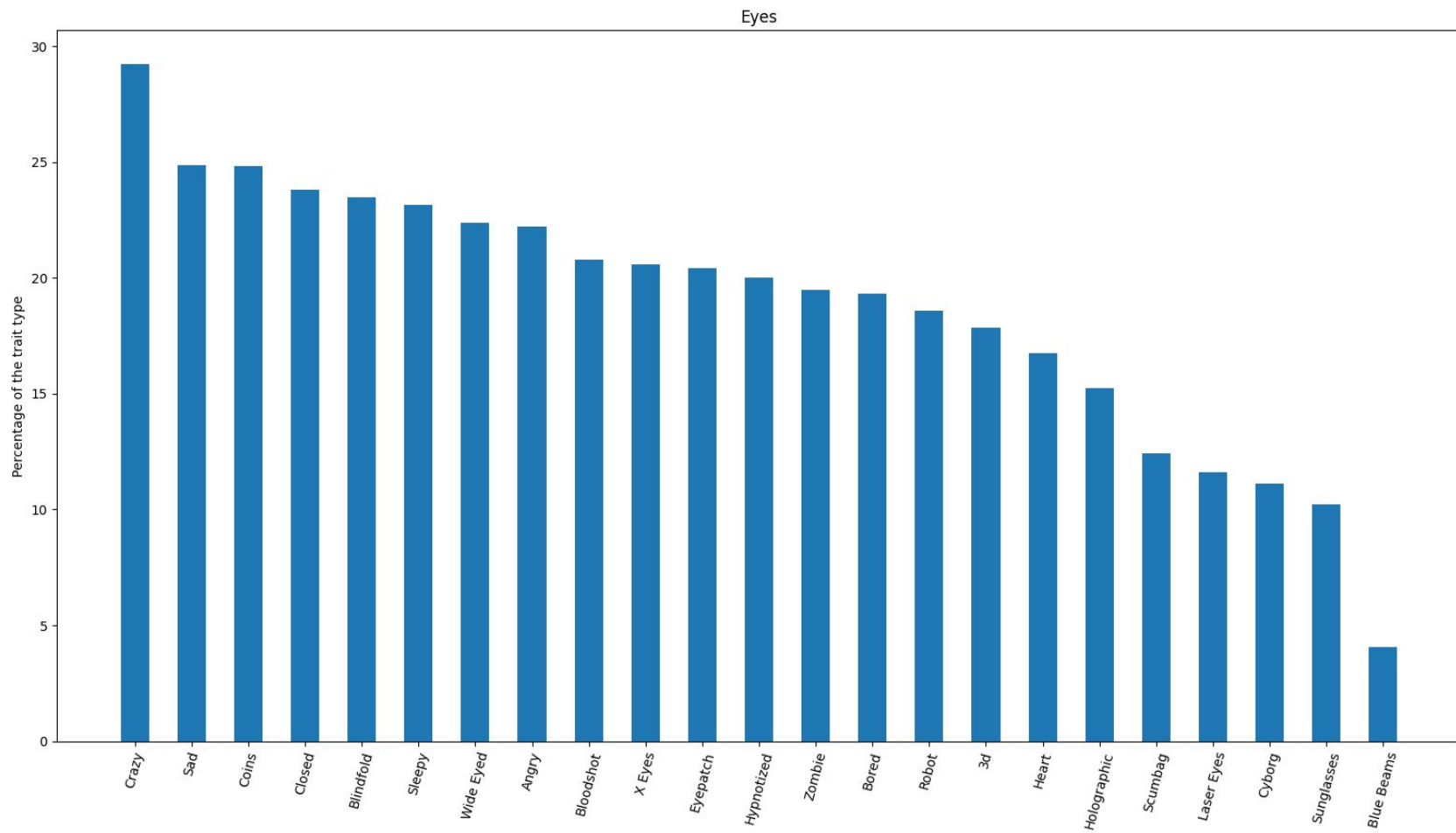
Analysis of least sold traits

- We found strong correlation between Floor Price vs. Percentage that have sold less than two times
- Most desired Fur traits sell the least
 - Fur traits to the left of the bar graph

Hypothesis - Most sold traits are least desirable

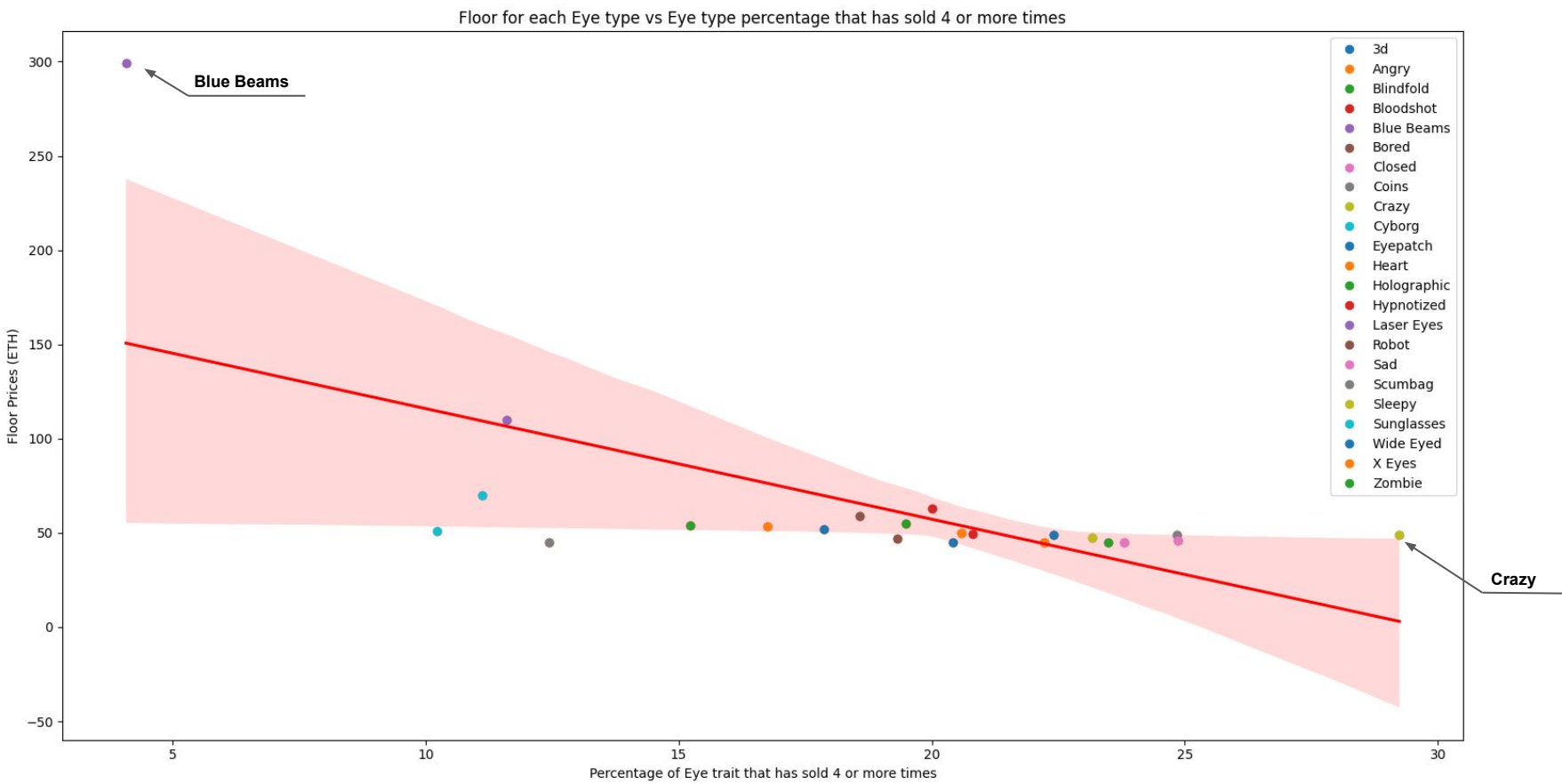
- Let's look at apes that have sold more than one standard deviation above the average sale frequency (4 or more times)

Percentage of Eye Traits that have sold 1 standard deviation above the mean (4 or more times)



Floor Price vs Percentage that have sold more than 4 times

$r = -.644$ (Strong Correlation)



Analysis of most sold eye traits

- We found strong correlation between Floor Price vs. Percentage that have sold more than four times
- Least desired Eye traits sell the most
 - Eye traits to the left of the bar graph

Most Desirable traits all-in-one ape

Background: New Punk Blue

Fur: Solid Gold

Mouth: Bored Unshaven Dagger

Eyes: Blue Beams

Earring: Diamond Stud

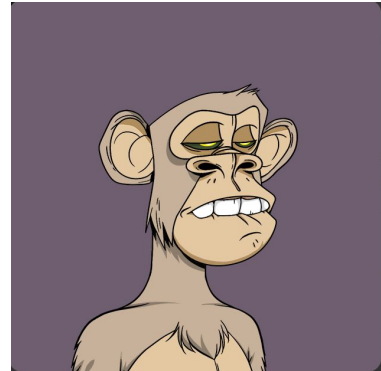
Clothes: Black Suit

Hat: King's Crown

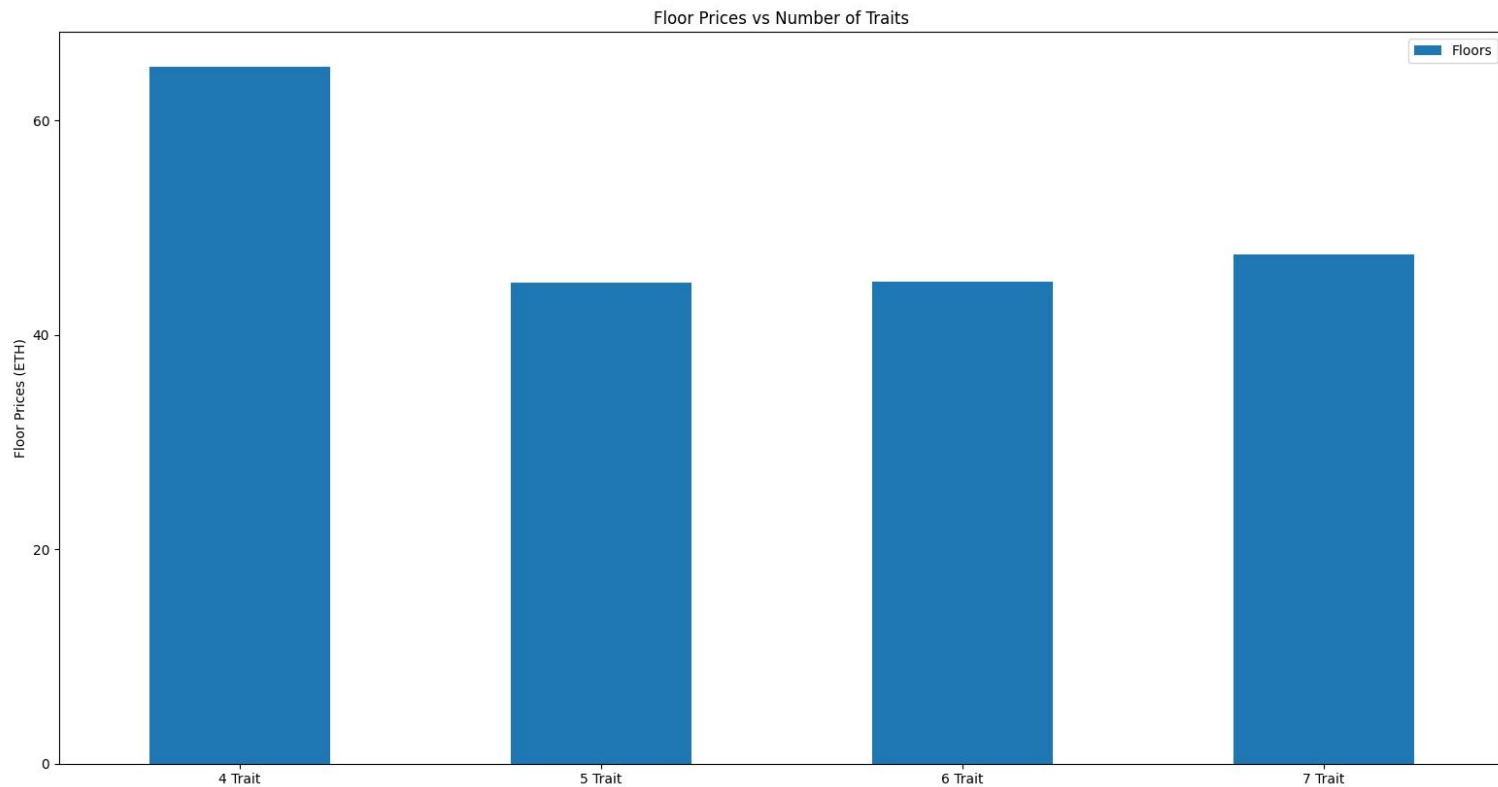


The phenomena of the 4 Trait Ape

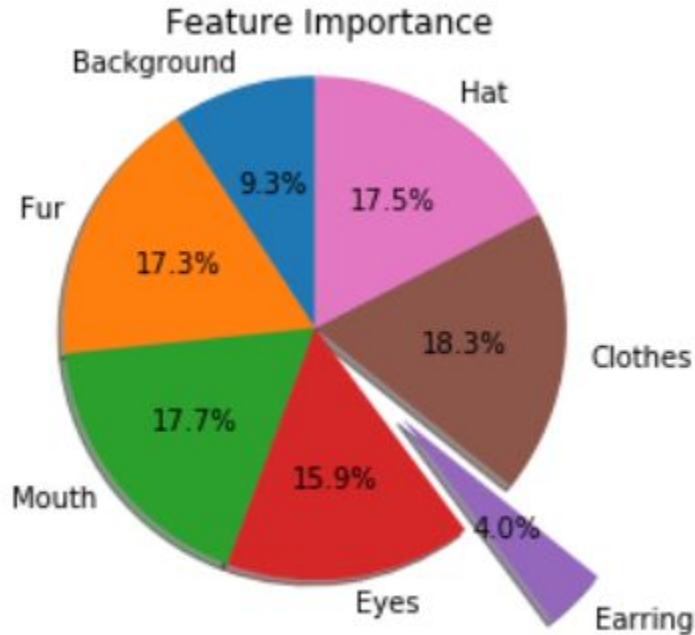
- Apes that only have the **required** number of traits are known as **4 Traits**
- Known to be “clean” and to have a more cohesive aesthetic
- This is reflected in the market prices



Floor price per Trait Count



Significance of each trait category



- Random Forest Model based on past sales helps determine how important each trait category is when determining the current market value of each ape
- **Earring trait seems to be the least significant trait category**

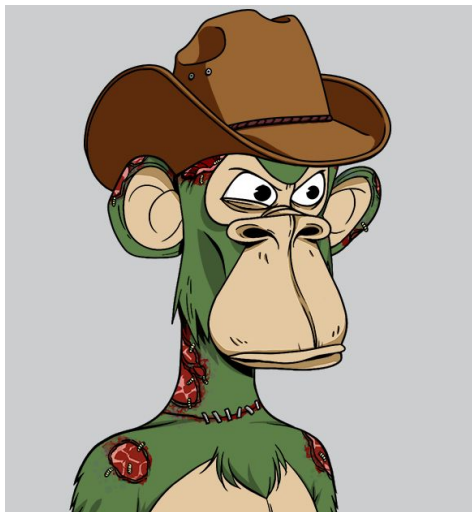
Are **5 Trait** Earrings a poor man's **4 Trait**?

- Earring Trait is the least significant Trait Category
- **4 Traits** have high market value due to aesthetic
- Does the market favor 5 trait **Earring** over 5 Trait **Hat** and 5 trait **Clothes**?



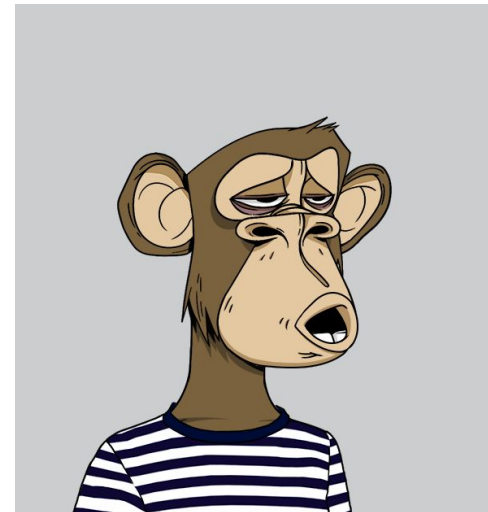
5 Trait Earring

Background: Aquamarine
Fur: Golden Brown
Mouth: Phenom Vuh
Eyes: Zombie
Earring: Silver Stud



5 Trait Hat

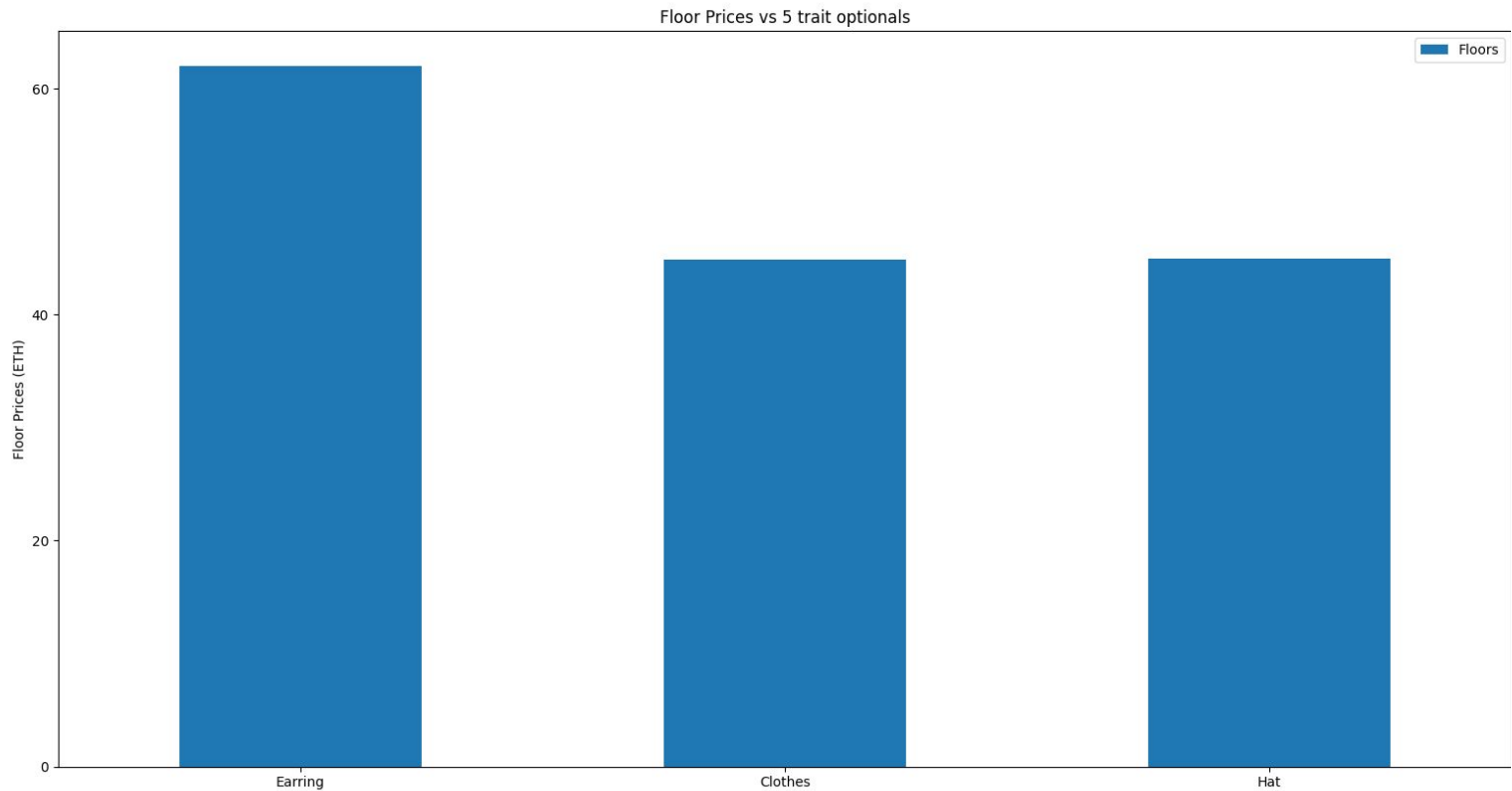
Background: Gray
Fur: Zombie
Mouth: Bored
Eyes: Angry
Hat: Cowboy



5 Trait Clothes

Background: Yellow
Fur: Black
Mouth: Bored Unshaven
Eyes: Scumbag
Clothes: Navy Striped Tee

Floor Price vs 5 Trait Optional



Poor man's 4 Trait Analysis

- 5 Trait Earrings are indeed a poor man's 4 Trait

Conclusion

- Analyzing the sale frequency by trait type, we can identify which traits are or are not desired and make predictions about future market trends
- Via Trait Significance analysis we can identify certain market edge cases
 - 5 Trait Earring = Poor Man's 4 Trait
- Incorporating live data for analysis would be the next step in improving decision making potential (so as to avoid making decisions on stale data)

References

- OpenSea: [Opensea.io](https://opensea.io)
- OpenSea Api: <https://docs.opensea.io/reference/api-overview>