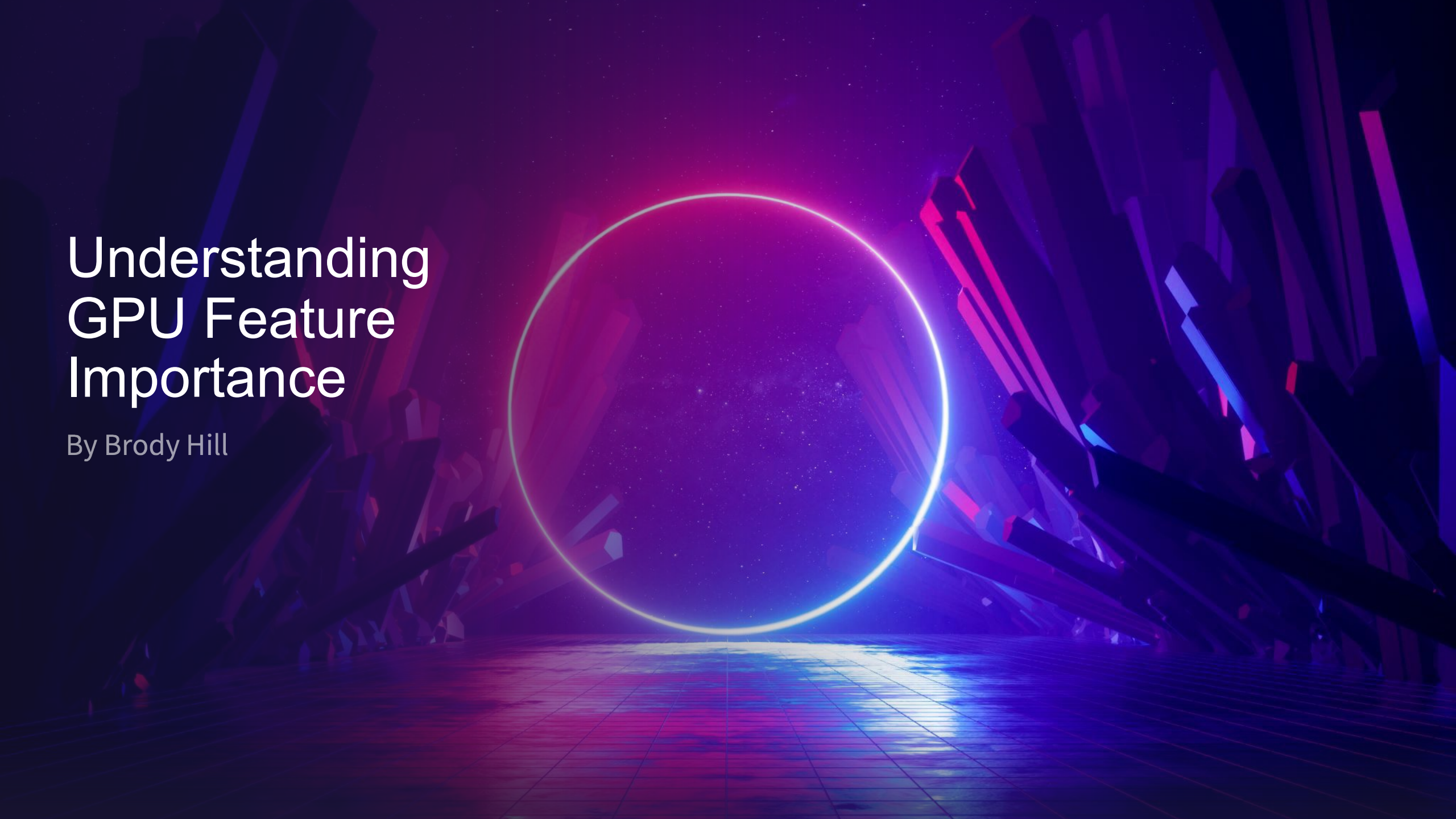


# Understanding GPU Feature Importance

By Brody Hill



## The Problem:

You're intel and you've just released your first line of GPUs.

AMD and NVIDIAs cards are crushing your best cards in rasterization performance. You need to understand which GPU features most impact performance so you can invest accordingly.





## The Solution:

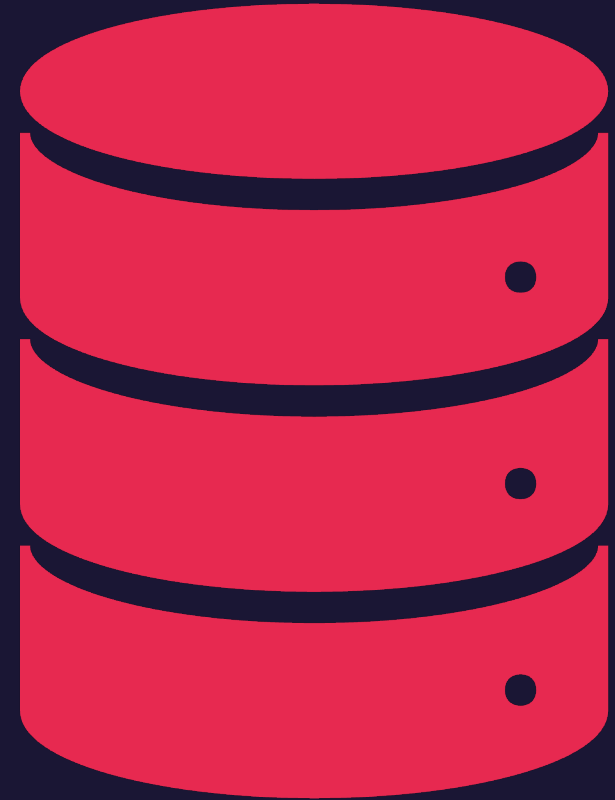
Invest heavily into cards with more texture mapping units and render output units.

# The Data:

I used two datasets here.

Dataset 1: [GPU Hardware Features](#)

Dataset 2: [GPU 3DMark Performance](#)



# Data Wrangling:



After merging my two datasets together on the GPU column, I had 1088 rows and 24 columns.



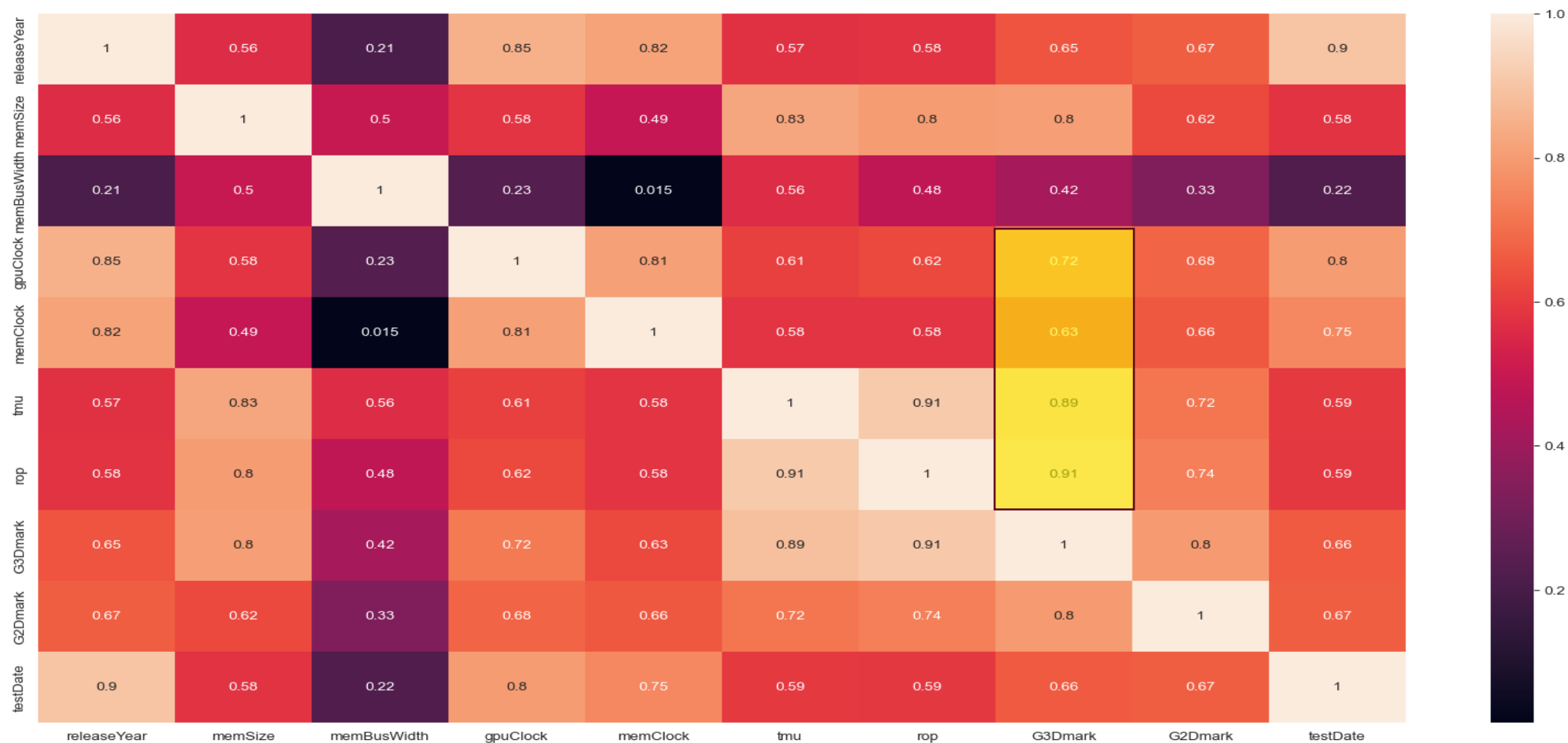
After examining and cleaning I had 786 rows and 17 columns.



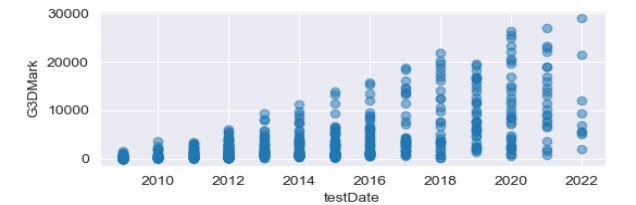
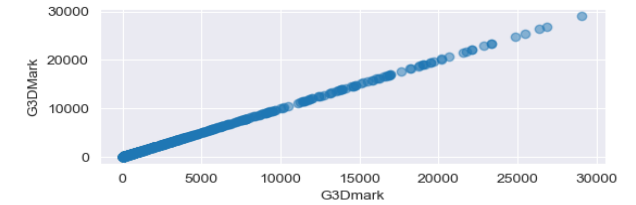
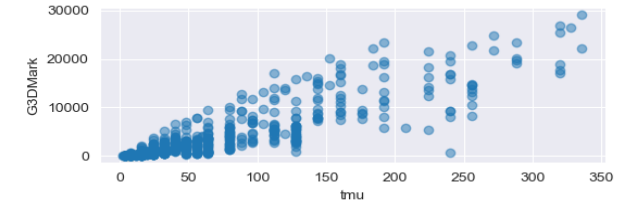
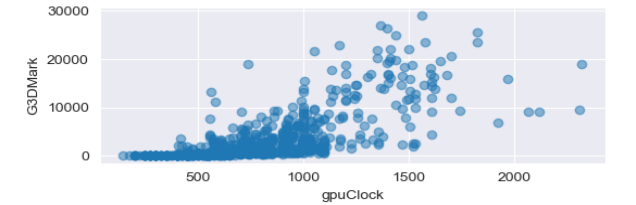
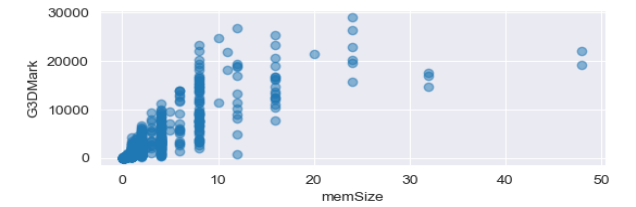
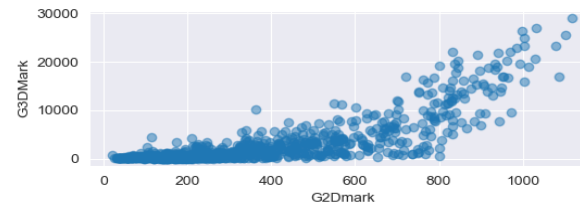
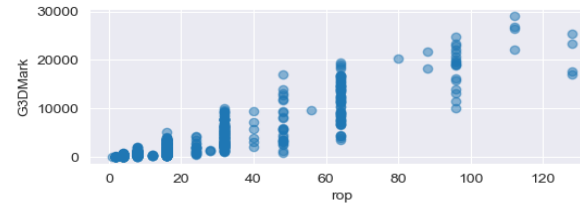
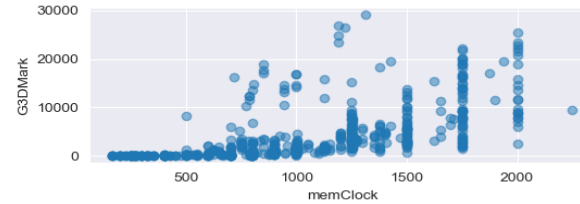
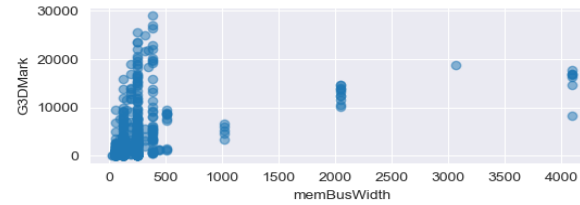
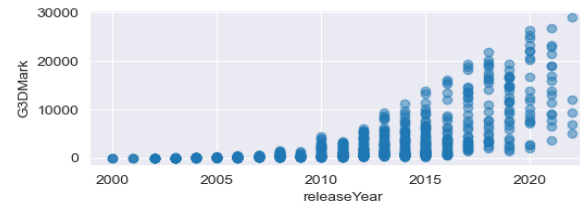
What actions did I take to get there?

- ✓ Dropped all duplicate GPUs, there were 134.
- ✓ Dropped columns that had over 20% of their data missing, there were seven.
- ✓ Created histograms and checked for outliers, there were not any suspicious values.
- ✓ Dropped any remaining rows that still contained missing values

# Exploratory Data Analysis Part 1:



# Exploratory Data Analysis Part 2:



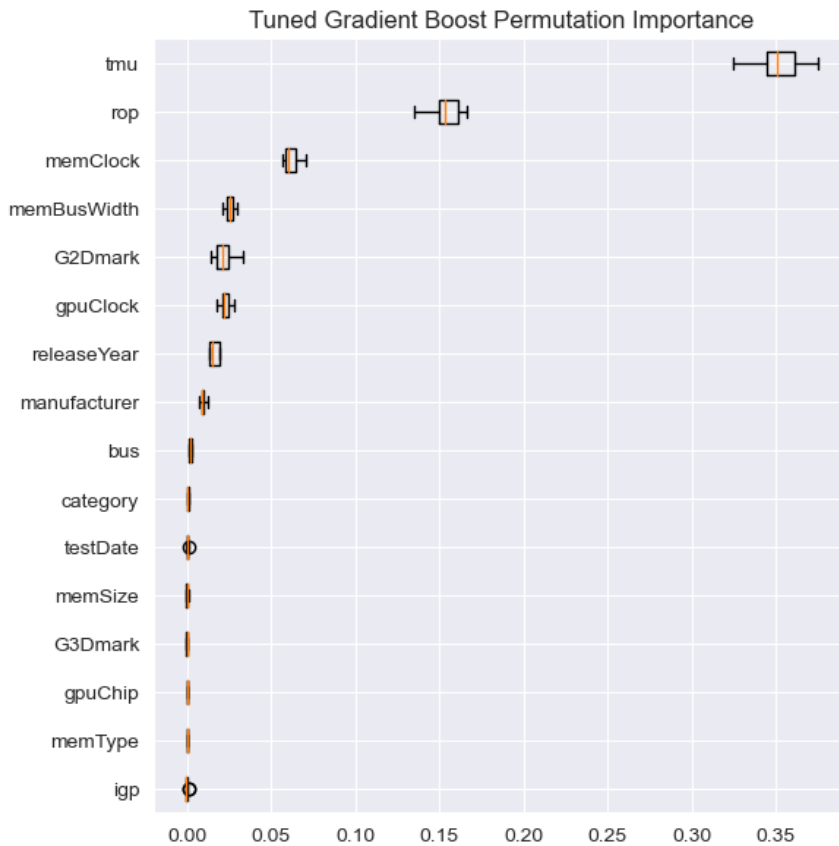
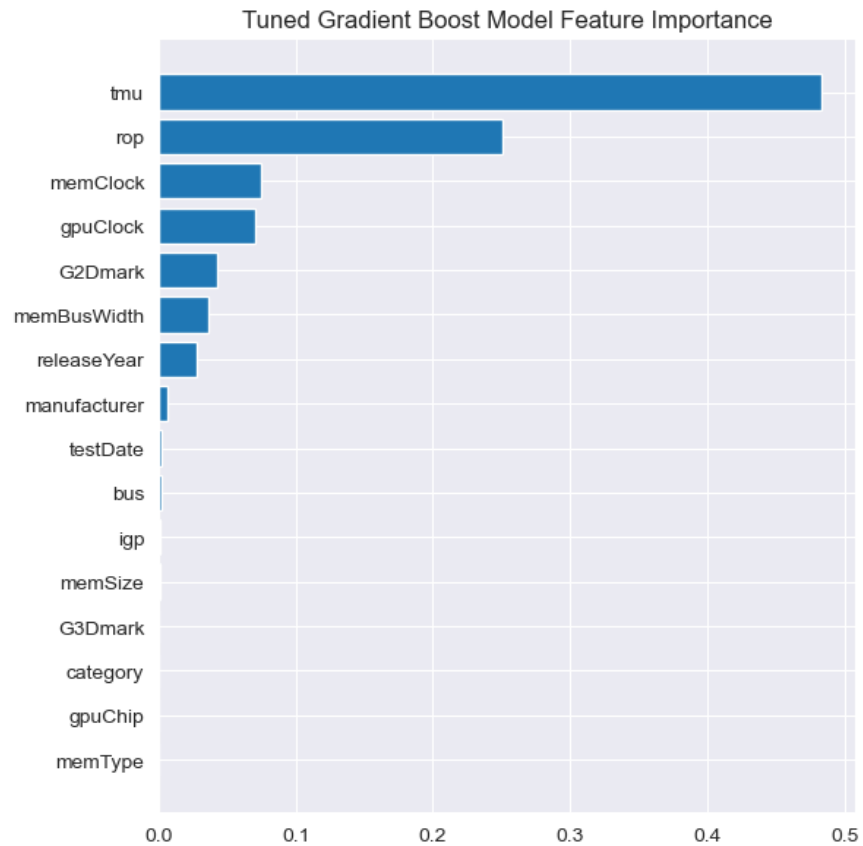


## Model Results:

	Algo	RSME	MAX ERROR
0	Basic RF - Dummy Encoded - Not Scaled	769.4113866	4515.84
1	Basic RF Random Search CV - Dummy Enc - Not Scaled	812.3486823	5045.304
2	Basic RF - Dummy Encoded - Standard Scaled	760.6156886	4608.85
3	Basic RF - No Cat Features - Not Scaled	792.0931225	4707.12
4	Basic RF - No Cat Features - Standard Scaled	764.4876283	3972.94
5	Basic RF - Count Encoded - Not Scaled	756.033055	4509.43
6	Basic RF - Count Encoded - Standard Scaled	756.8486875	4420.44
7	Basic GB - Count Encoded- Not Scaled	760.3670806	3740.828103
8	Tuned GB - Count Encoded - Not Scaled	716.3156962	3737.880053



# Feature Importance:



## Takeaways:

- ✓ Gradient Boosted model tuned on the learning rate and number of estimators parameters provided the best results.
- ✓ Feature importance aligned well with initial heatmaps. TMUs and ROPs are the best predictors of 3DMark performance.
- ✓ Invest in cards with more TMUs and ROPs, while keeping clock speeds in mind.

## Future Research:

- ✓ Gather more GPU data and repeat.
- ✓ Find CPU data and combine with GPU data for a more comprehensive view.
- ✓ Focus only on newer hardware. (2020+)



Questions?

