COMS 6998
Machine Learning & Climate

Predicting CPU and GPU Features for Efficient and Sustainable ML Engineering

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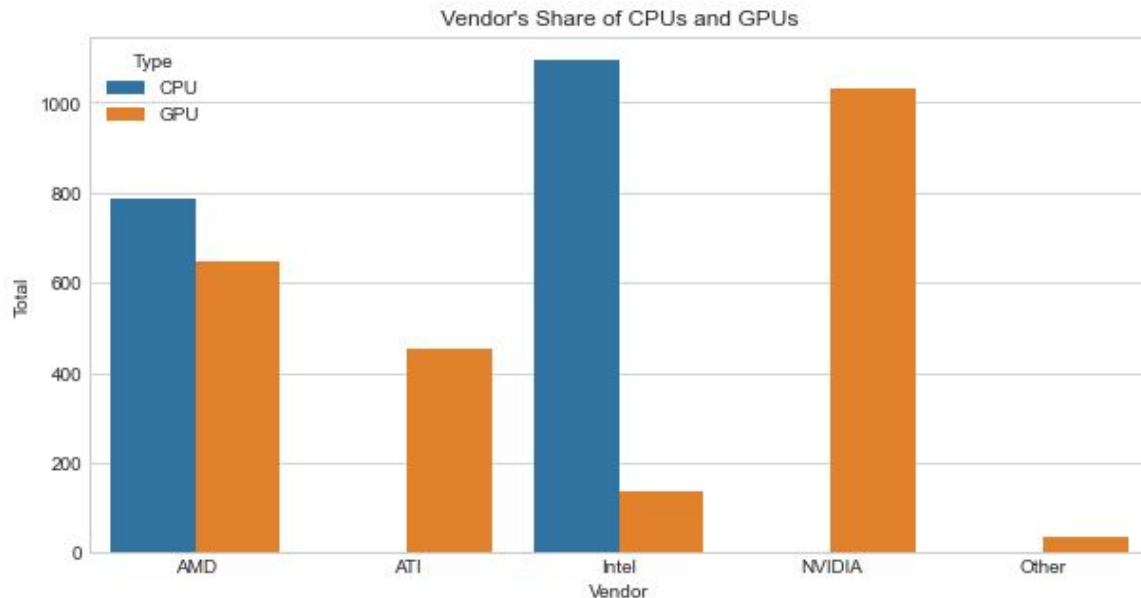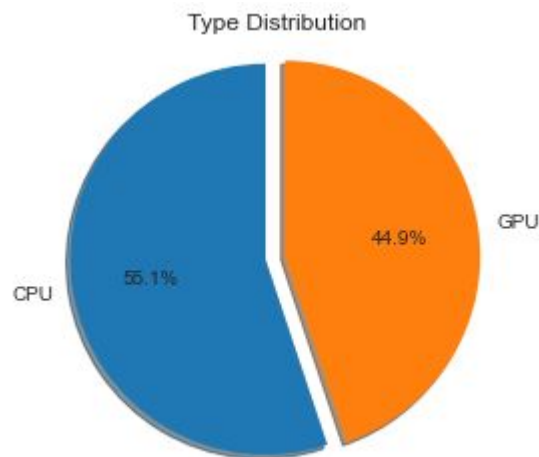# Background
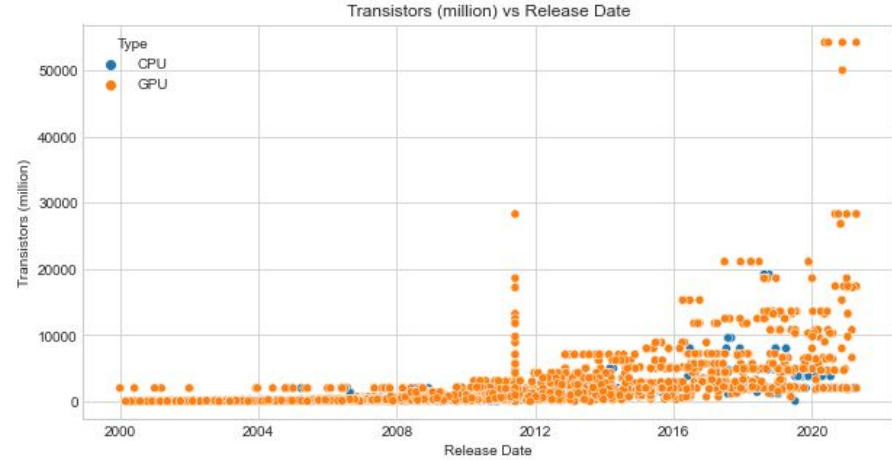
- Cost
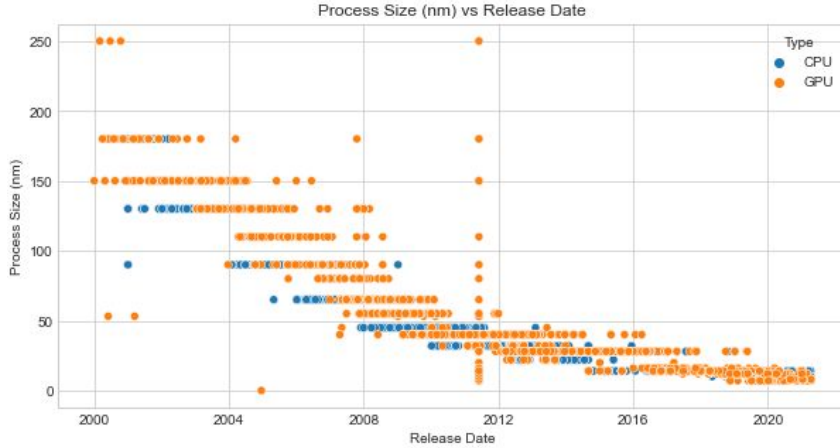
- Performance

- Energy Consumption

Dataset

	Unnamed: 0	Product	Type	Release Date	Process Size (nm)	TDP (W)	Die Size (mm^2)	Transistors (million)	Freq (MHz)	Foundry	Vendor	FP16 GFLOPS	FP32 GFLOPS	FP64 GFLOPS
0	0	AMD Athlon 64 3500+	CPU	2007-02-20	65.0	45.0	77.0	122.0	2200.0	Unknown	AMD	NaN	NaN	NaN
1	1	AMD Athlon 200GE	CPU	2018-09-06	14.0	35.0	192.0	4800.0	3200.0	Unknown	AMD	NaN	NaN	NaN
2	2	Intel Core i5-1145G7	CPU	2020-09-02	10.0	28.0	NaN	NaN	2600.0	Intel	Intel	NaN	NaN	NaN
3	3	Intel Xeon E5-2603 v2	CPU	2013-09-01	22.0	80.0	160.0	1400.0	1800.0	Intel	Intel	NaN	NaN	NaN
4	4	AMD Phenom II X4 980 BE	CPU	2011-05-03	45.0	125.0	258.0	758.0	3700.0	Unknown	AMD	NaN	NaN	NaN
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4849	4849	NVIDIA Quadro 3000M	GPU	2011-02-22	40.0	75.0	332.0	1950.0	450.0	TSMC	NVIDIA	NaN	432.0	36.0
4850	4850	Intel GMA 950	GPU	2005-06-01	90.0	7.0	NaN	NaN	250.0	Intel	Intel	NaN	NaN	NaN
4851	4851	NVIDIA GeForce GT 320M	GPU	2010-03-03	40.0	23.0	100.0	486.0	500.0	TSMC	NVIDIA	NaN	52.8	NaN
4852	4852	NVIDIA GeForce FX 5200	GPU	2003-03-06	150.0	NaN	65.0	29.0	250.0	TSMC	NVIDIA	NaN	NaN	NaN
4853	4853	NVIDIA GeForce 9300 SE	GPU	2008-06-01	65.0	NaN	86.0	210.0	540.0	TSMC	NVIDIA	NaN	20.8	NaN

4854 rows × 14 columns

Findings About Dataset

Type Distribution

Vendor's Share of CPUs and GPUs

Findings About Dataset

Process Size (nm) vs Release Date

Transistors (million) vs Release Date

Findings About Dataset

Freq (MHz) vs Release Date
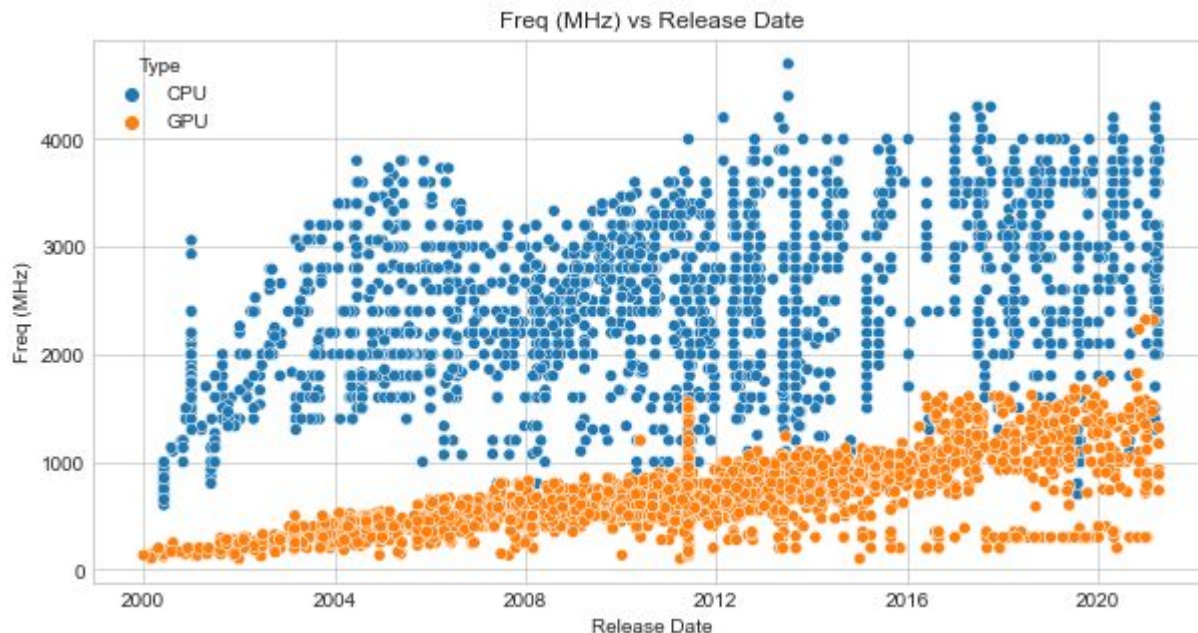
Predicting The Type of Microprocessor Based On Other Features

```
Baseline accuracy: 0.5017921146953405
```

```
kNN accuracy: 0.989247311827957
```

```
kNN precision: 0.9904420549581839
kNN recall: 0.9904420549581839
kNN f1-score: 0.9904420549581839
```

```
Decision Tree final model accuracy: 0.994026284348865
```

```
Decision Tree precision: 0.9952324194982963
Decision Tree recall: 0.995221027479092
Decision Tree f1-score: 0.9952210411222289
```

```
Random Forest final model accuracy: 0.996415770609319
```

```
Random Forest Precision: 0.9964186356680409
Random Forest Recall: 0.996415770609319
Randome Forest F1-score: 0.9964157808417153
```

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Thank You!