Data Analysis on CPU Performance

By
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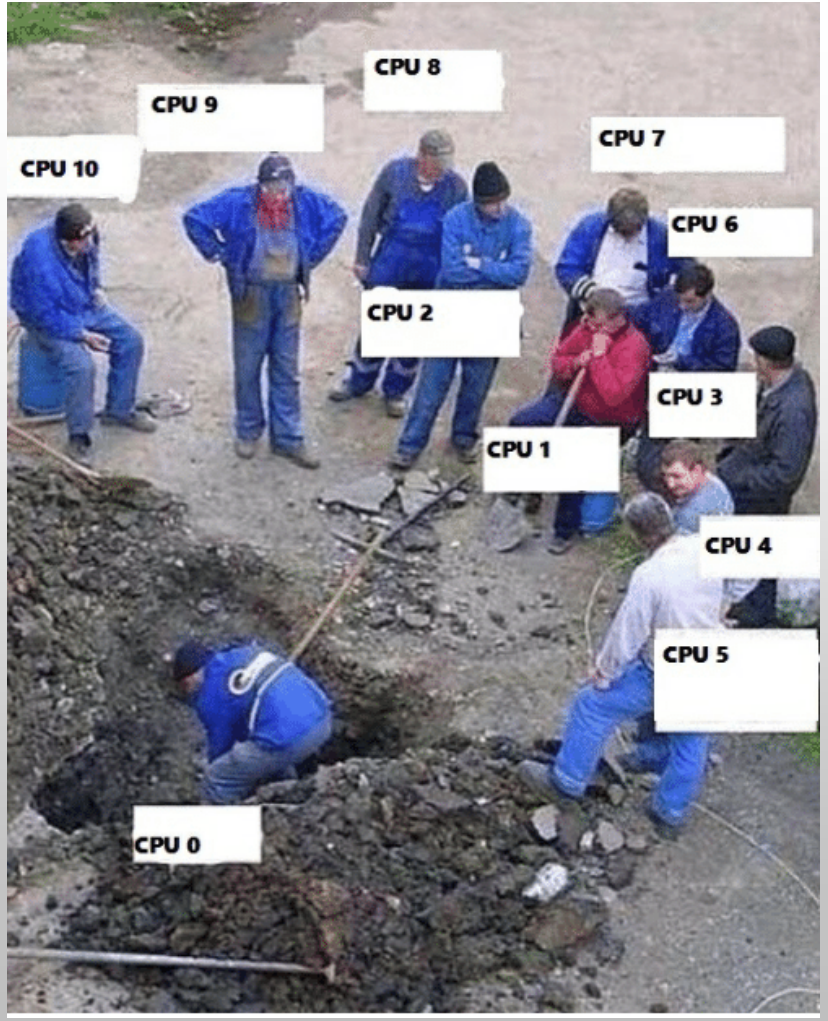
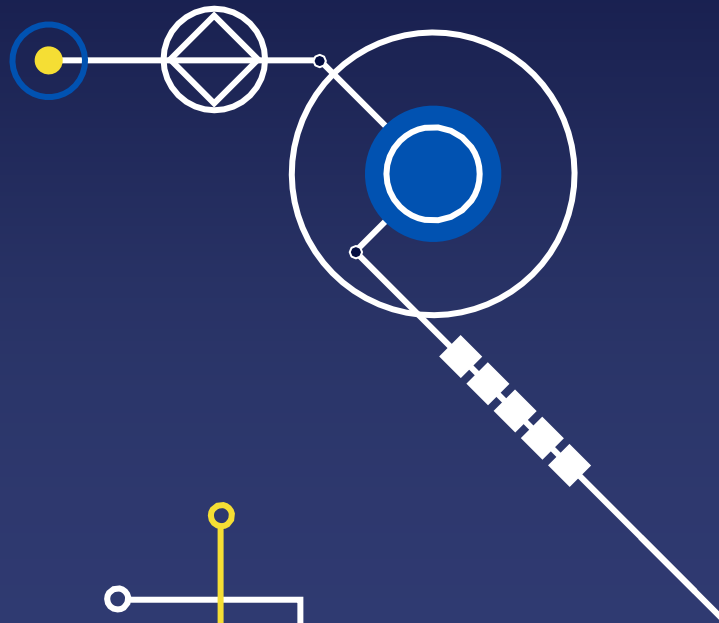
Research Question

Are the boost clock speeds of CPUs accurate measures of their performance?

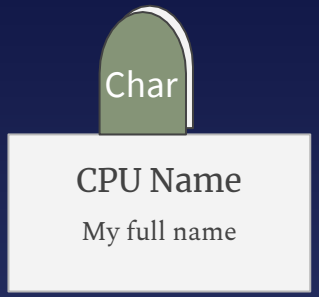

CPU 8
CPU 9
CPU 7
CPU 10
CPU 6
CPU 2
CPU 3
CPU 1
CPU 4
CPU 5
CPU 0

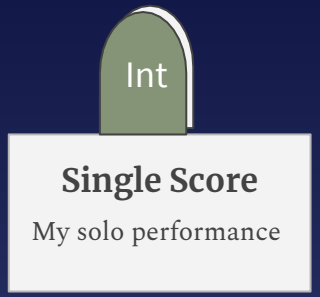
Data Collection

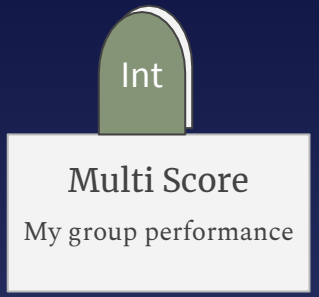
Users run the CineBench R23 software on their PCs and submit their scores to the CineBench website. A random sample of this data has been used for our analysis.

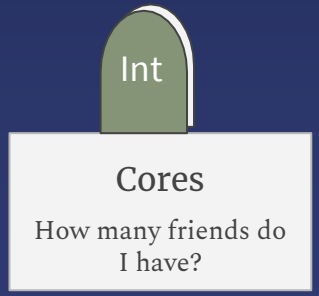


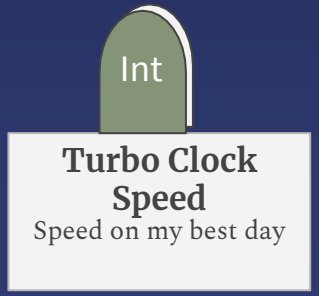
Observations











Data Insights

Sample Size = 215

Single Core Scores:

Mean = 1368

Median = 1312

Standard Deviation = 239.829

Min = 903

Max = 2082

Turbo Clock Speeds:

Mean = 4.515

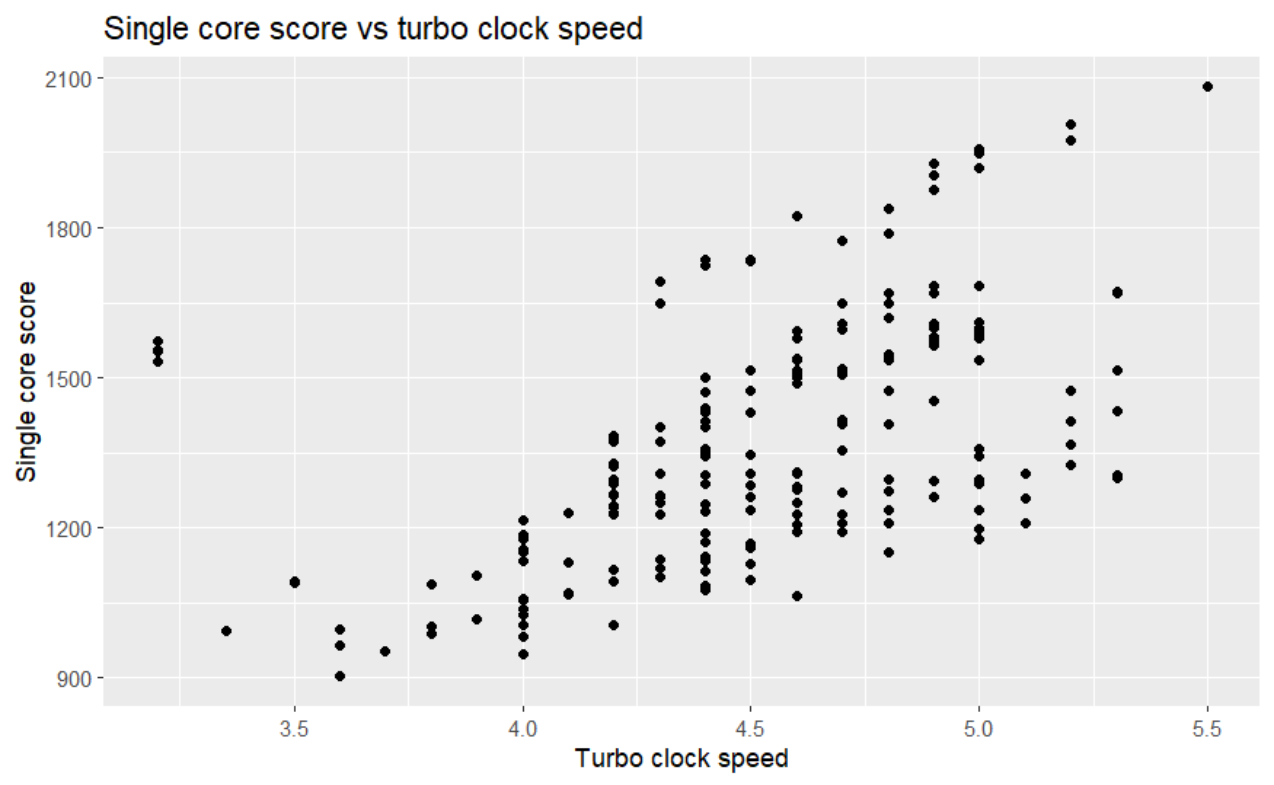
Median = 4.500

Standard Deviation = 0.441

Min = 3.200

Max = 5.500

Performance vs Boost speed



Hypothesis

No linear relationship between single core scores and turbo clock speeds ($ß_1 = 0$)

Positive linear relationship between single core scores and turbo clock speeds ($ß_1 > 0$)

Simple Linear Regression Model

$$\hat{y} = \beta_0 + \beta_1 \hat{x} + \varepsilon$$

Single core score

Intercept of the single core score and turbo clock speed regression line

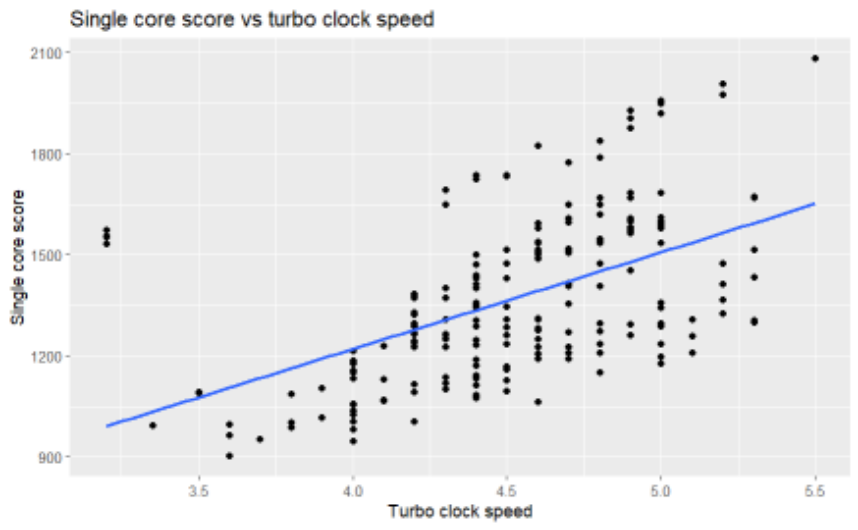
Turbo clock speed

Slope of the single core score and turbo clock speed regression line

Error ~ $N(0, \sigma^2)$

Conditions

LINEAR

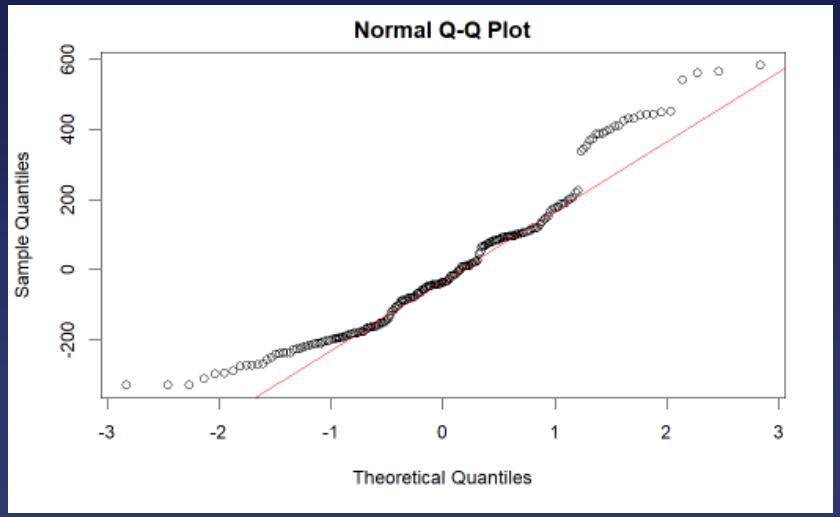


INDEPENDENCE

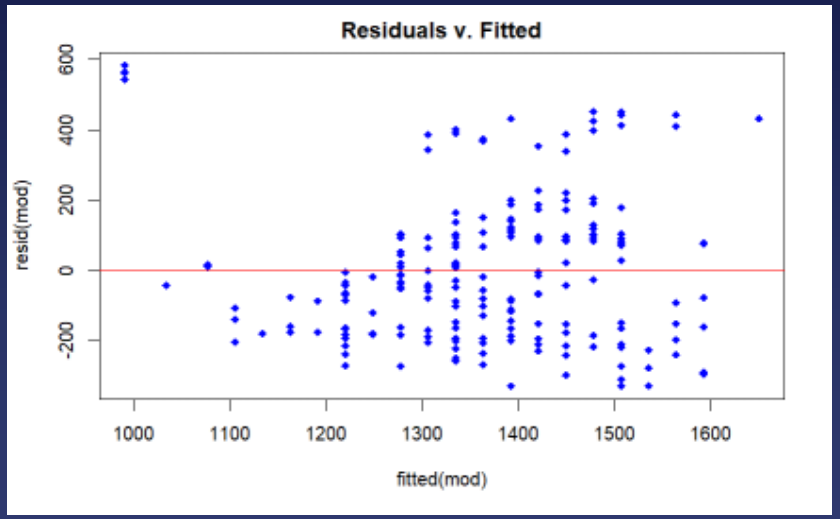
Since the data was collected from independent users who submitted their Cinebench scores to Cinebench website, the data can be assumed to be independent.

Conditions

NORMALITY



EQUAL VARIANCE



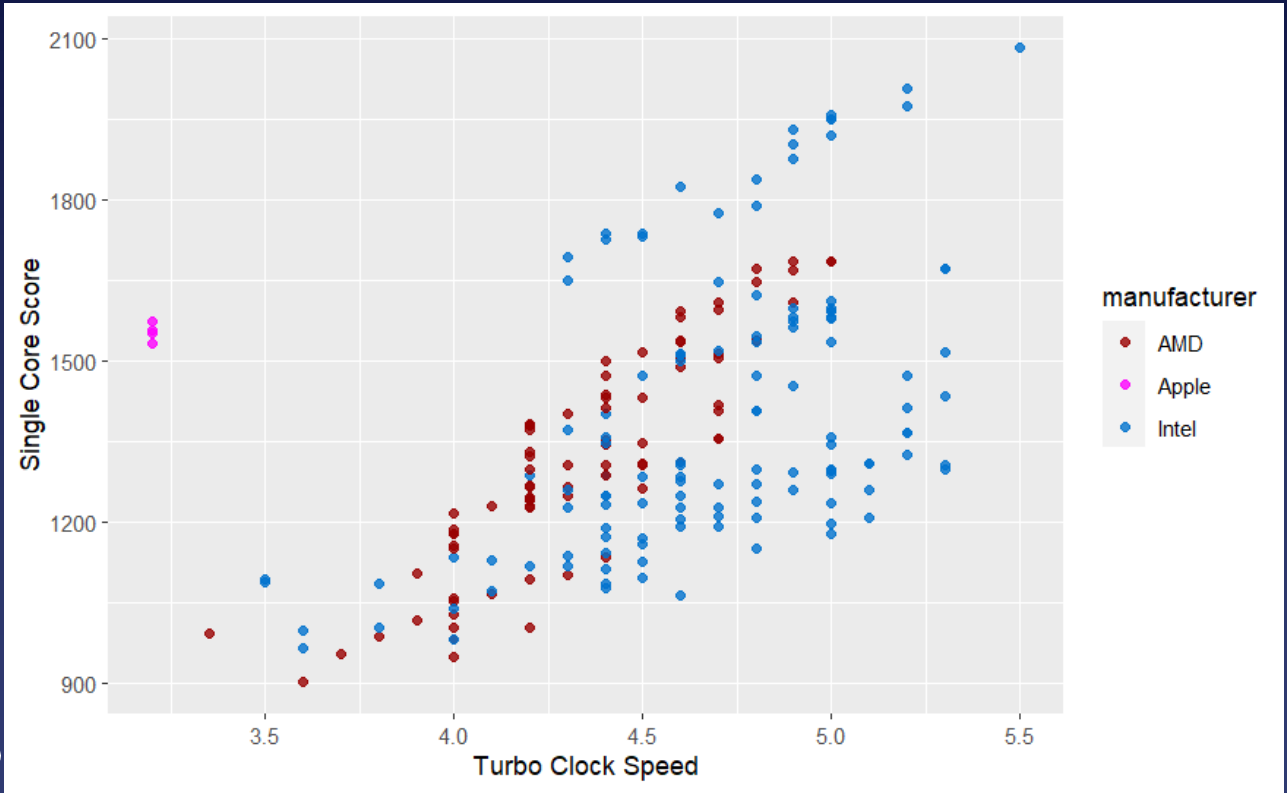
LINEAR REGRESSION MODEL STATISTICS SUMMARY

	β_0	β_1	Error	t-value	p-value	Conf. Int.
TURBO CLOCK	72.85	286.78	31.61	9.071	< 2e-16	(224.4601, 349.0955)

Conclusion

- p-value is less than 0.05, thus we reject the null hypothesis
- There exists a POSITIVE LINEAR relationship between single core score and turbo clock speed
- Better performance can be expected from CPUs with higher boost speeds in general

Discoveries




CORE i9
EXTREME
intel
CORE i9
X-series

$1999


VISA
MasterCard
Maestro

Limitations

- Data may not be produced in an ideal environment
- Sample size may not be sufficiently large
- CPU architectures are not same (x86, ARM, etc)
- Depends on the operating system

Future Scope

- Extending our regression model to include multiple other predictors
- Checking the relationship between turbo clock speeds and multi-core performance
- Analysing the relationship between single core scores and CPU temperatures

Thank You