DS2000 – Programming with Data

01. Computers and Python

John Rachlin, PhD Northeastern University



The history of computing



Early Electronic Computing (1950-1980)

The PC Revolution (1980-1995)

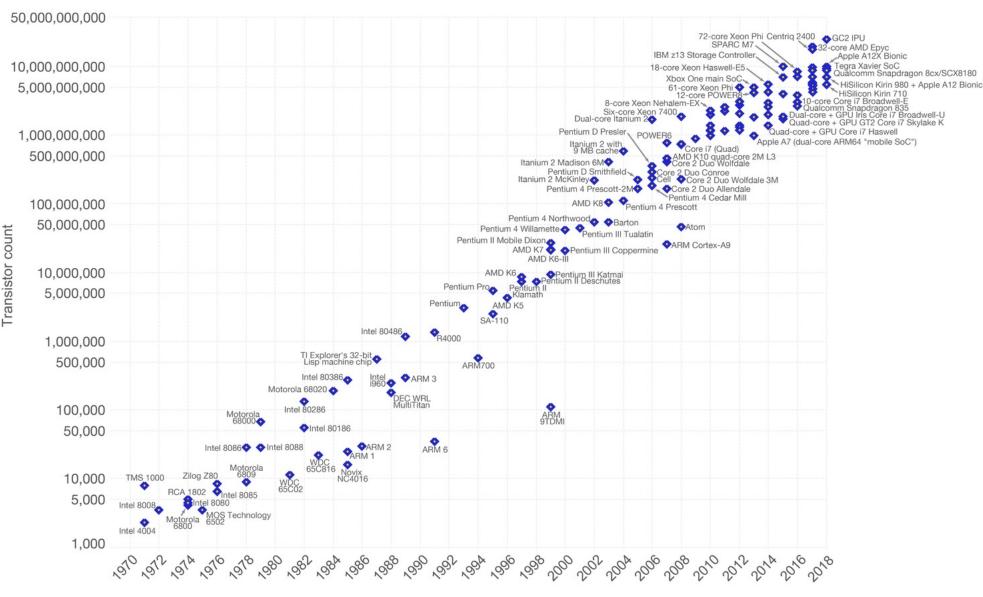
The Internet Revolution (1995 - 2010)

The Smartphone Revolution (2007-present)

The AI / Cloud / Data Science Revolution (2010 -)

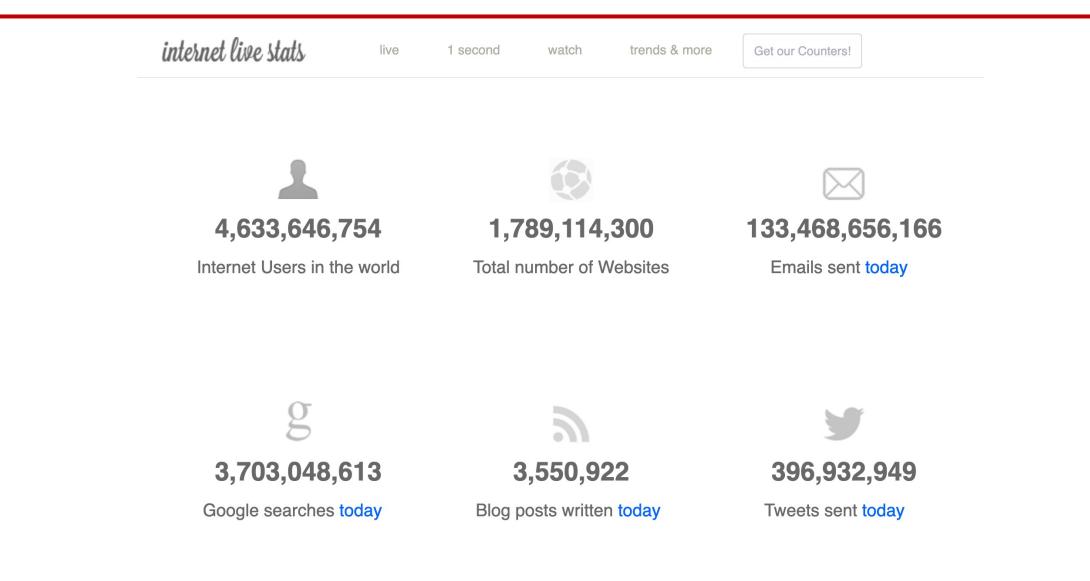
Moore's Law – The number of transistors on integrated circuit chips (1971-2018)

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important as other aspects of technological progress – such as processing speed or the price of electronic products – are linked to Moore's law.



Data source: Wikipedia (https://en.wikipedia.org/wiki/Transistor_count) The data visualization is available at OurWorldinData.org. There you find more visualizations and research on this topic. Our World in Data

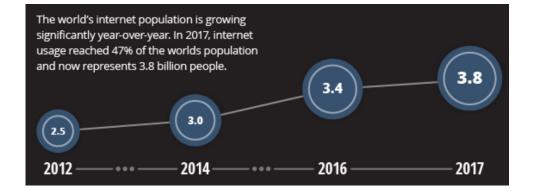
Internet Stats – Noon on Jul 31st, 2020





Source: http://www.internetlivestats.com/

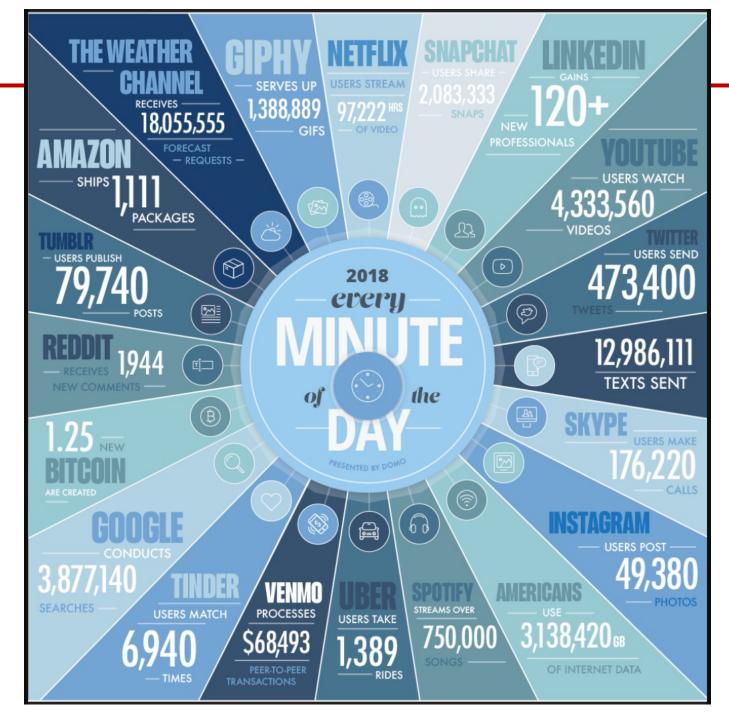
More data every minute



Source:

https://www.domo.com/learn/data-never-sleeps-6

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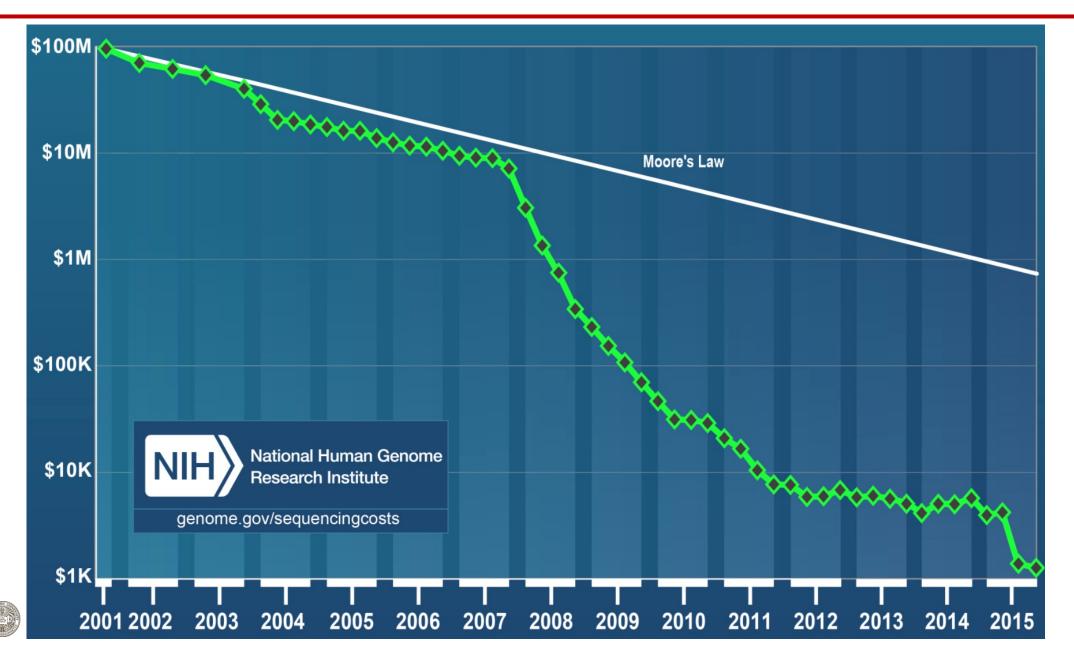
You are worth \$82 to Facebook...



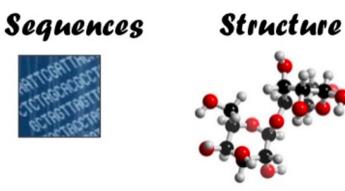
...how much is Facebook worth to you?



Cost to sequence a single human genome.



Data Science and Bioinformatics



Lipids, Carbohydrates



Genome Complete Genome of Arabidopsis thaliana

Literature

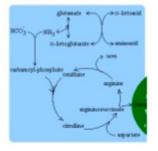


Primary Database:Direct experimental resultsSecondary Database:Derived databases from transformation & analysis

Source: https://www.slideshare.net/shwetakagliwal/biological-databases-11267007



Pathways



Data Science and Medicine: Electronic Medical Records

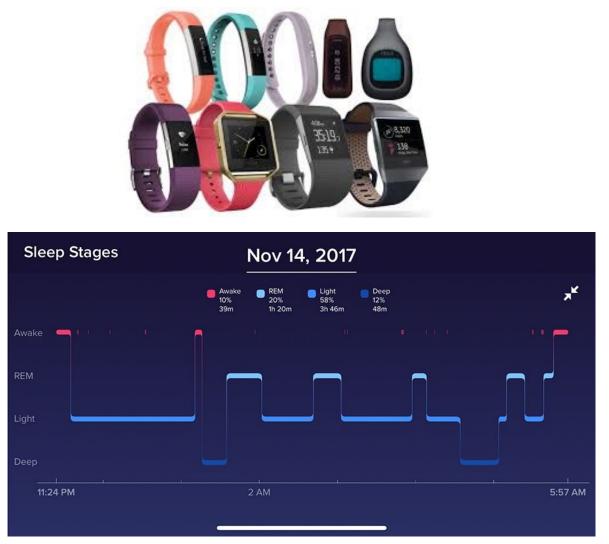
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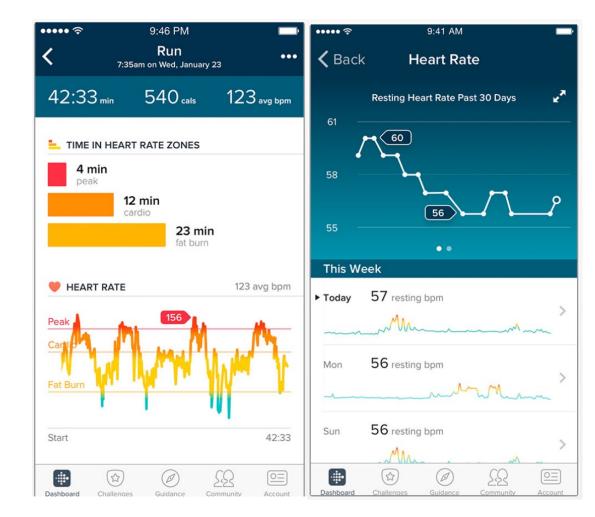
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- Patient Demographics
- Doctors
- Insurance
- Medical history
- Allergies
- Procedures / Measurements (BP, Temp, O₂)
- Order Lab Tests 🔁 Lab Results
- Dr. Notes

Next time you get a physical, notice how much time your doctor spends at a computer terminal!

Data Science and Wearable Sensors for better health

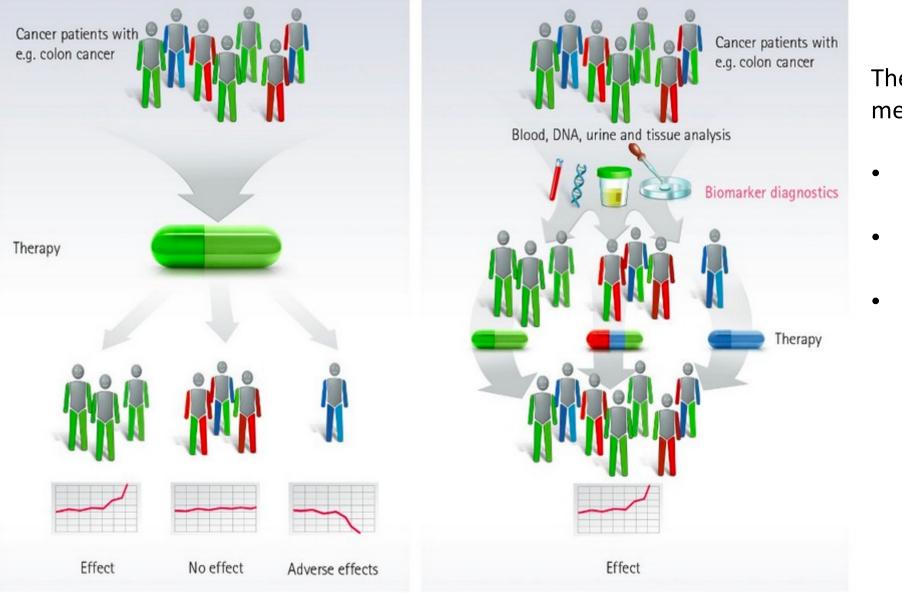




https://finance.yahoo.com/news/exclusive-fitbits-6-billion-nights-sleep-data-reveals-us-110058417.html

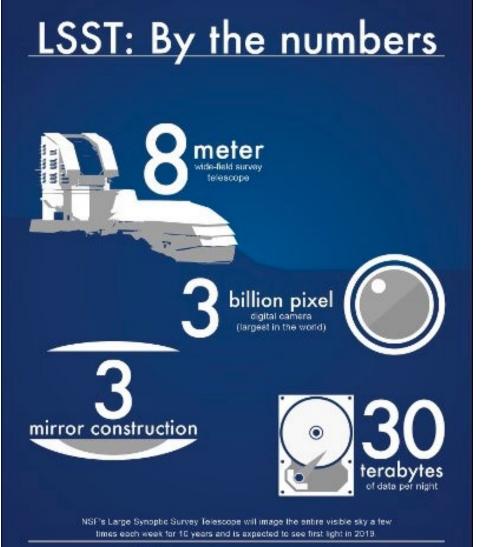
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Data Science and personalized medicine



The promise of personalized medicine:

- Improved efficacy
- Reduced adverse side-effects
- Reduced "trial-and-error" delays in the treatment of time-critical diseases such as cancer.



NSIN NATIONAL SCIENCE FOUNDATION

The LSST will be an 8-meter wide-field survey telescope that will image the <u>entire visible sky a few</u> <u>times each week for 10 years</u>, providing an unprecedented amount of information while transforming the emerging discipline of data-enabled science. It is expected to see first light in 2019 and begin full operation in 2022.

