CS315: Principles of Database Systems
Big Data

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Tue, Fri 1530-1700 at CS101

Big Data

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- Data which is big
- How big is “big”?

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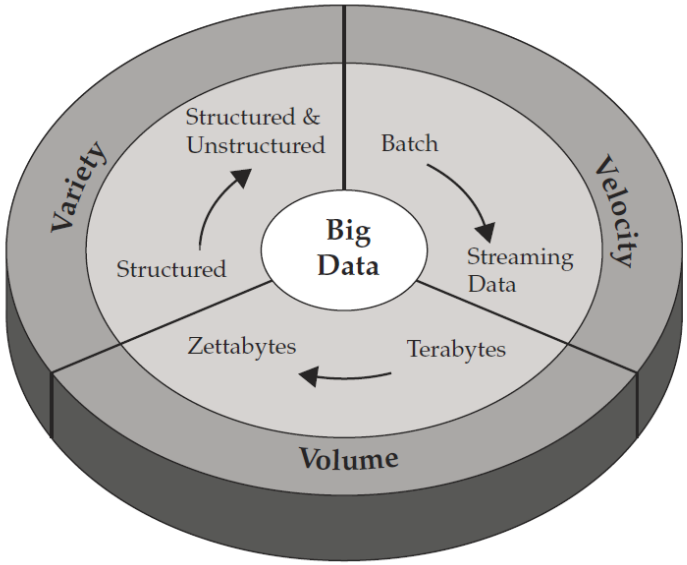
- So, no absolute definition or threshold
- When data is bigger than most machines can store or most algorithms can handle

Characterization of big data

- Having large volumes of data requires
  - Newer techniques
  - Newer tools
  - Newer architectures
- Allows solving newer problems
  - Can also solve older problems better

Properties of big data



- 3 V's: volume, variety, velocity
- Volume: When data is extremely large in size, how to load it, index it or query it
- Variety: Data can be semi-structured or unstructured as well; how to query
- Velocity: Data can arrive at real time and can be streaming

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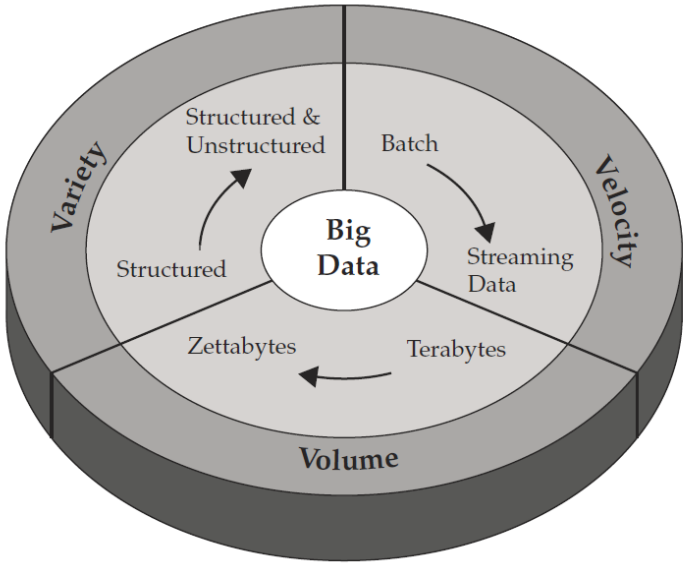

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- Velocity: Data can arrive at real time and can be streaming
- Extended V's: veracity, validity, visibility, variability

Enablers of big data

- Increased storage volume and type
- Increased processing power
- Increased data
- Increased network speed
- Increased capital
- Increased business

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  - Tracked over 10^3 days (about 3 years)
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  - Total number of hotels is 10^5
    - Each day, 10^7 people stay in a hotel
    - Per hotel, 10^2 people stay

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- Total pairs of people is (roughly) 5×10^{17}
  - Any 2 out of 10^9: $\binom{10^9}{2}$
- Expected number of suspicions, i.e., number of people meeting twice on any pair of days is 2.5×10^5
  - $5 \times 10^{-13} \times 5 \times 10^{17}$
- Bonferroni's principle: if you look in more places for interesting patterns than your amount of data supports, you are bound to "find" something "interesting" (most likely spurious)

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- Operations: Querying, indexing, analytics
  - Data mining, Information retrieval
  - Machine learning: Mahout on top of Hadoop

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- Most applications do not require big data
- “Big Data” is currently too hyped