Differentially Private Location-based Histogram Publication

Student: CHAN, Lo Yuet
Supervisor:LOUKIDES, Grigorios

MOTIVATION

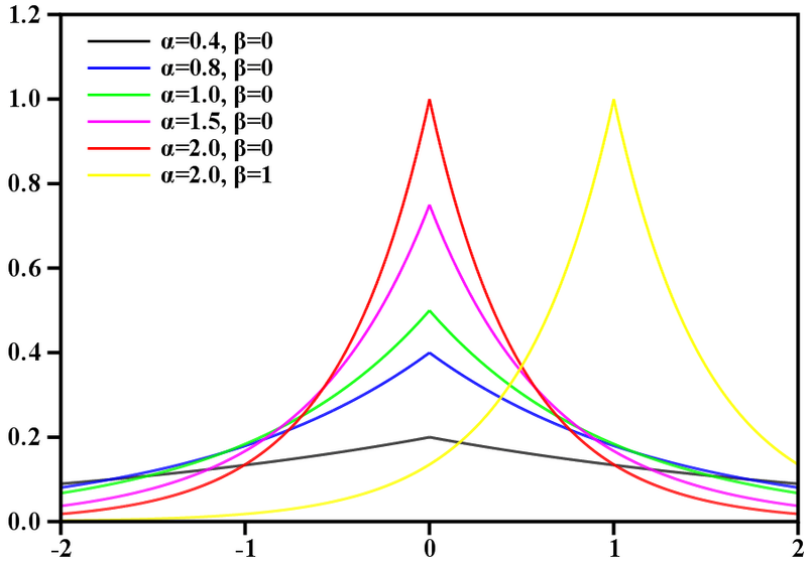
- Social plaform is part of our life
- Private, sensitive information

- Valuable data about life pattern and behaviour
- Privacy infringement

- Blur datasets into each other
- Preserving important pattern in datasets

PROBLEM

- Apply i.i.d. Laplace noise
- Lap (μ, b)



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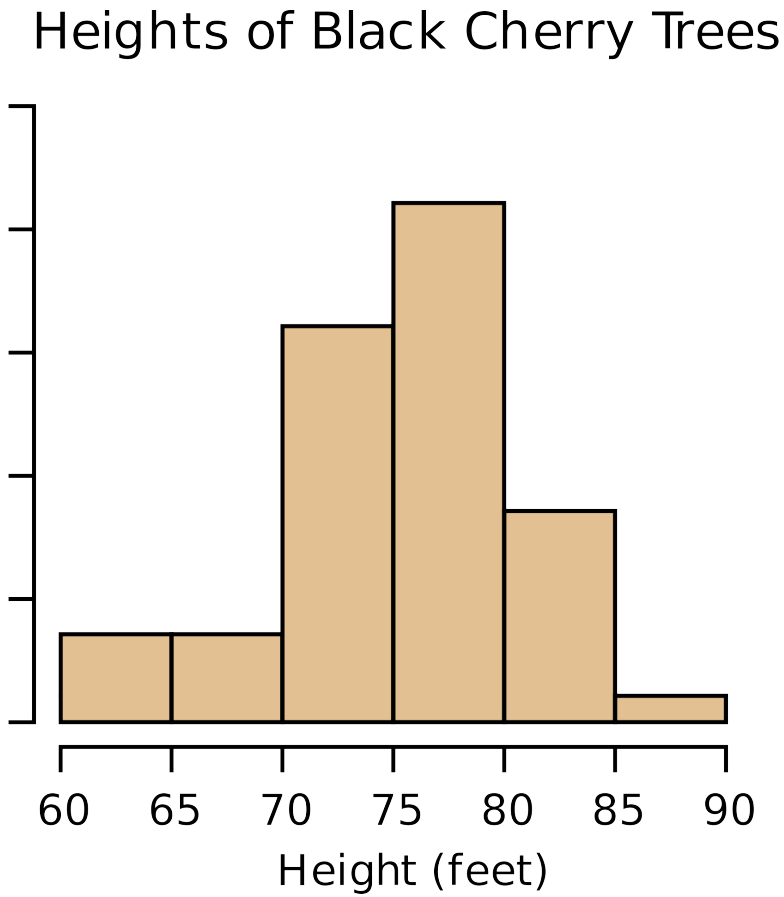

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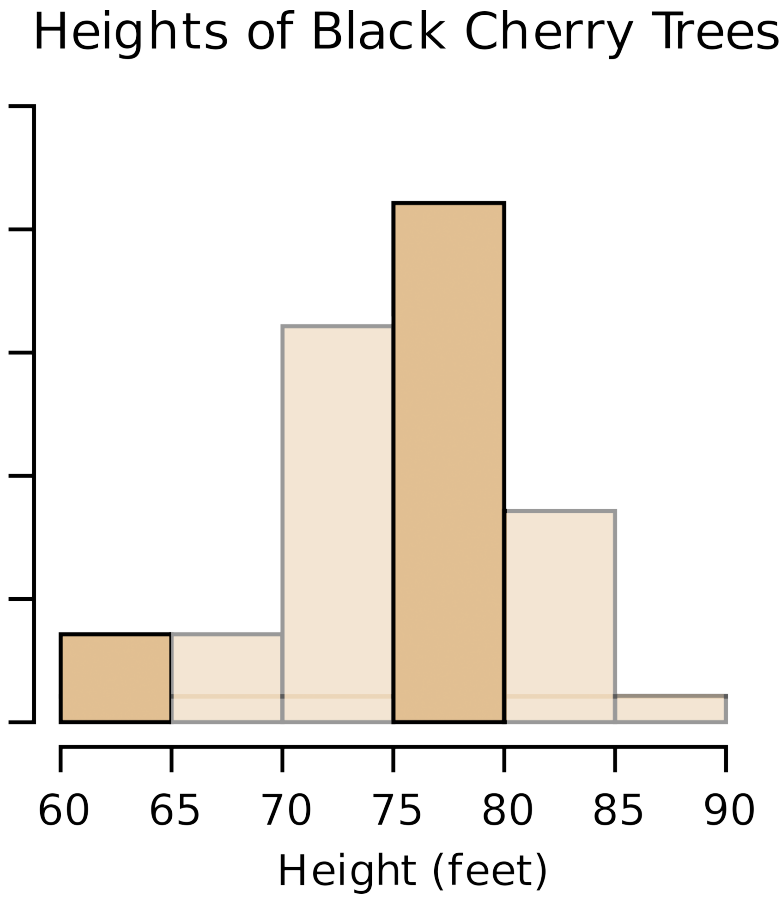

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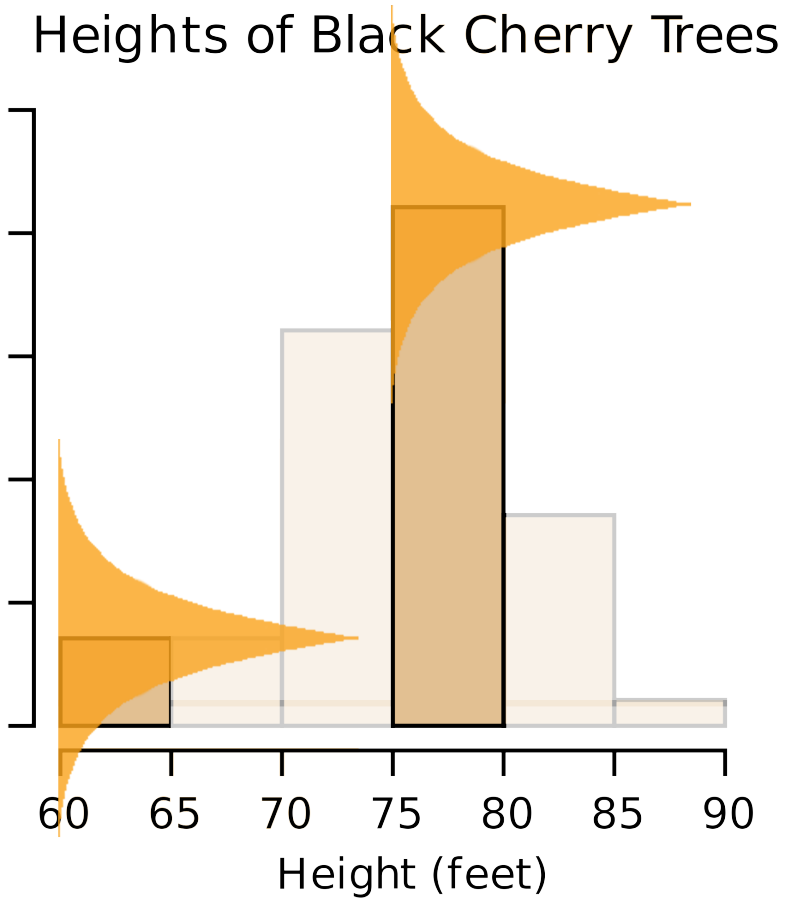

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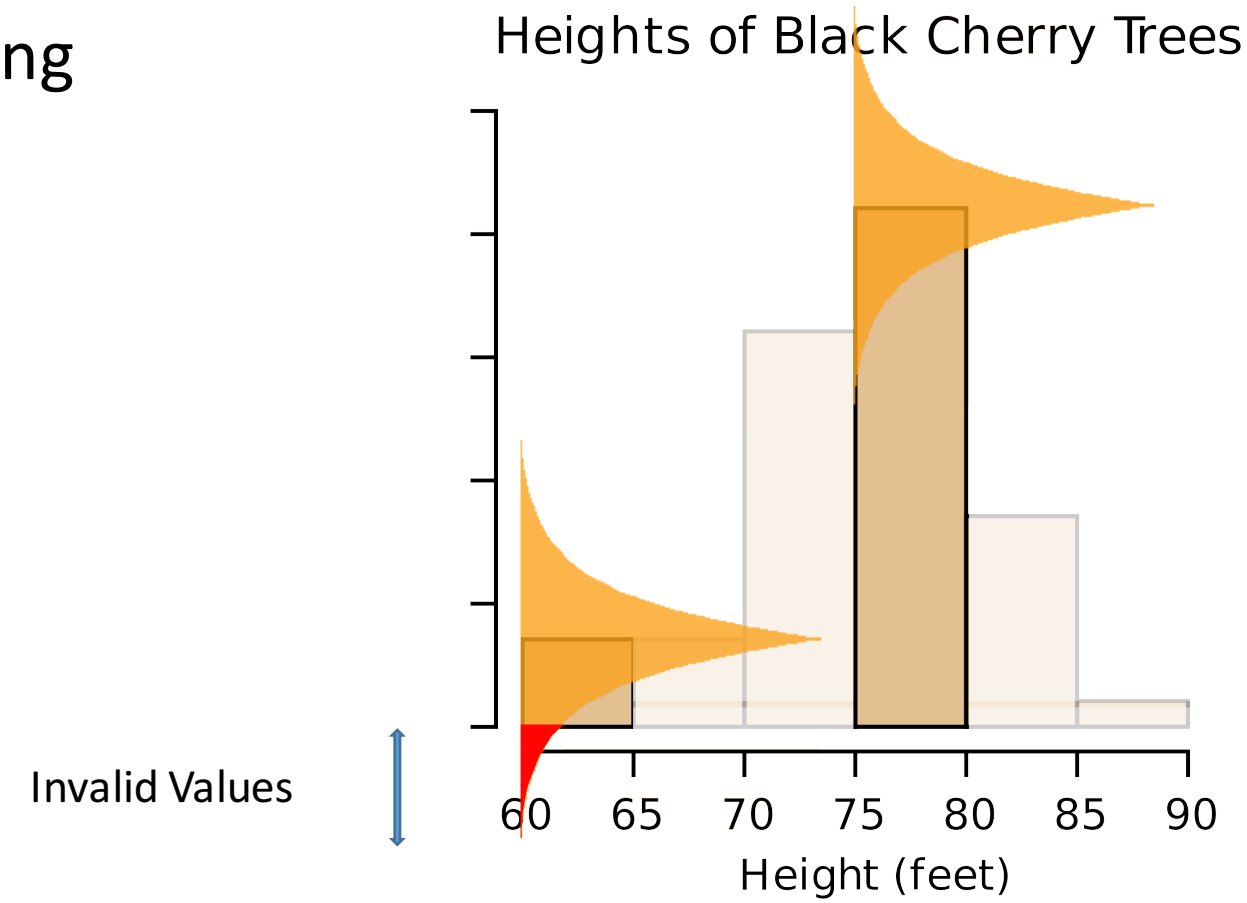
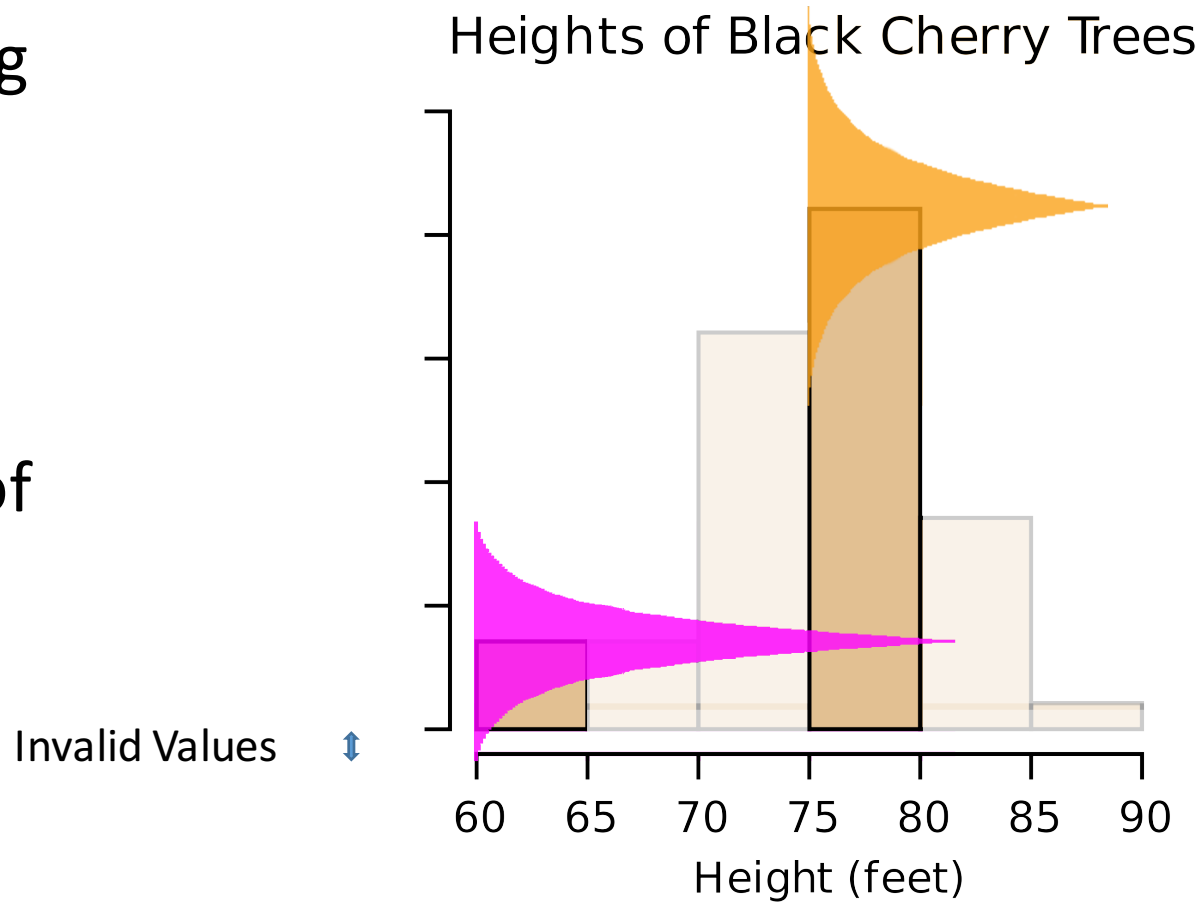
- Apply i.i.d. Laplace noise
- Result in high chance of getting invalid values



PROBLEM

- Apply i.i.d. Laplace noise
- Result in high chance of getting invalid values

- Apply i.d. Laplace noise
- Minimise/reduce the change of getting invalid values



APPROACH

- Statistical proof
- Test & Experiment
  - Four open datasets from FourSquares

1. Apply Laplacian noise with scale (b) relative to the count
2. Apply Laplacian noise after testing all possible combinations
3. Apply Laplacian noise according to sorted rank

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RESULT

- Two Utility Metrics
  - KLD (measuring preservation of data distribution)
  - MSE (measuring error of range queries)

- Anticipate to outperform on both KLD and MSE

Q & A SECTION