# Locally Differentially Private Frequency Distribution Estimation with Relative Error Optimization

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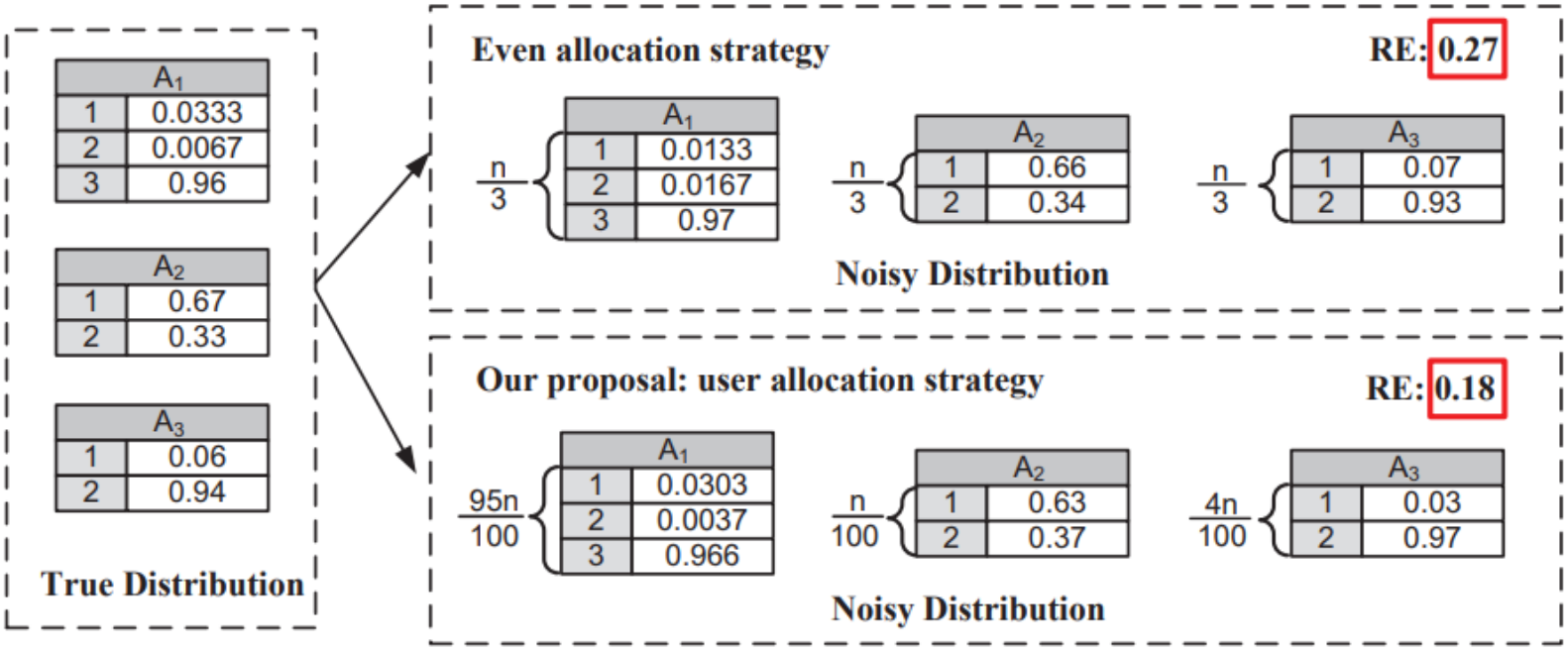
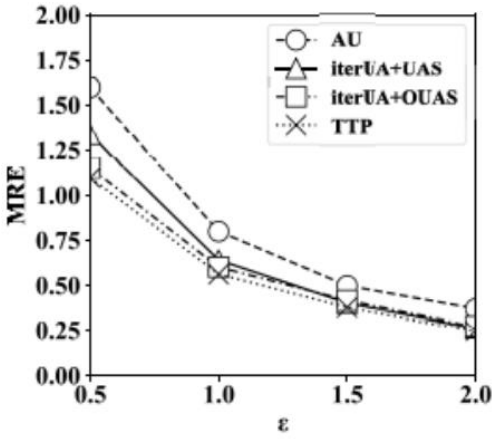
# Problems & Ideas

- Problems
  - Existing LDP-compliant frequency distribution estimation works focus on absolute error optimization. That makes the frequencies with smaller values dominated by noise and leads to inferior data utility.
- Ideas
  - relative error optimization problem can be solved by assigning more users to dimensions with skewed frequency distribution, and fewer users to dimensions with uniform distribution.

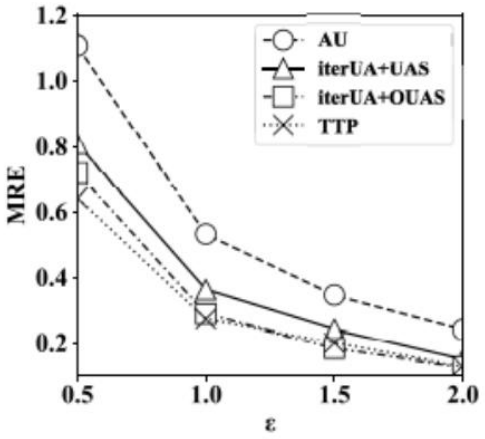


# Main Contributions

- Contributions:
  - We construct the relationship between user allocation for dimensions and relative error of frequency distribution estimation under LDP, based on which we design the user allocation strategy;
  - We propose iterUA, the first LDP framework for the relative error optimization of frequency distribution estimation on multidimensional data, which iteratively constructs user allocation strategy between users and dimensions;
  - We optimize the allocation strategy in iterUA by considering the relative error for the estimation accumulated from all performed iterations, rather than the one only from the current iteration.




(a) BR




(b) MX