Differential Privacy and Adjacent Methods: A Case Study Involving Federal Tax Information

Gabriel Medeiros

Questions for Committee

- Is noise infusion an **improvement** over cell suppression for this product?
- What level of distortion is **too much**?
- How much insight should be **provided to users** into the noise infusion process?
- How much information should be provided to users on **variability** of cell distortions?
  - Flags?
  - Something else?
- Any other questions users might like to see answered?

BEA Confidentiality Research

- Regional Directorate presenting research on Differential Private Adjacent Methods to protect confidentiality in Federal Tax Information

- International Directorate presenting research on “EZS” noise infusion method to protect confidentiality for a trade in services survey

Current Approach: Suppressions

BEA utilizes IRS schedule C and Form 1065 data in the calculation of proprietor’s income.

Based on various suppression rules:

- 11.5% of state records are suppressed
- 31% of county records are suppressed

Concepts: Differential Private Adjacent Methods

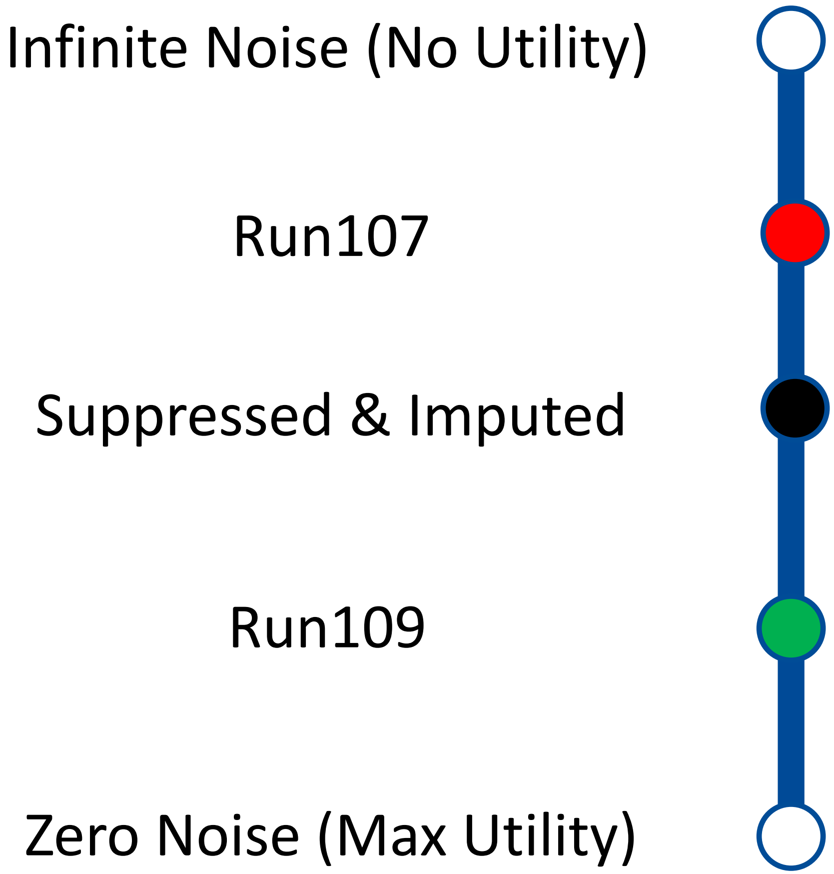
Differential Privacy:

Amount of noise infusion guided by privacy budget and by <u>theoretical</u> sensitivity of statistic to inclusion of any given record

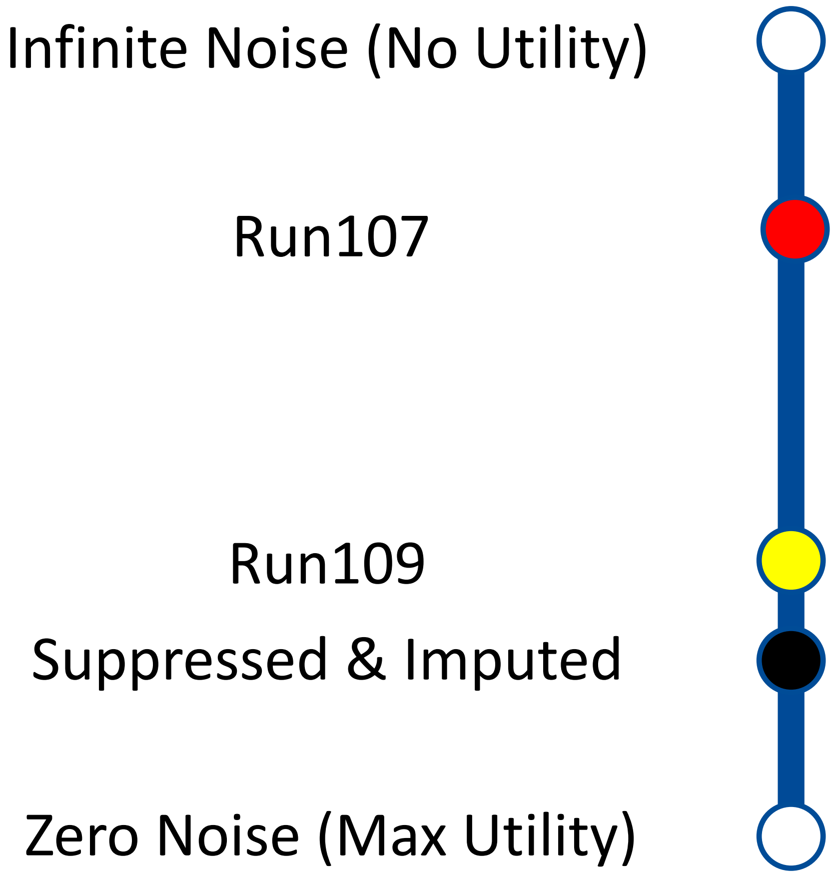
Differential Privacy Adjacent Methods:

Amount of noise infusion guided by privacy budget and by <u>observed</u> sensitivity of statistic to inclusion of any given record

State Results Utility; Cell Size <= 20



Utility of State Results; Cell Size > 20



Selected Results of Disclosure Metrics

- Imputations of the smallest record in the cell had on average high percent error.
- Imputations of the largest record in the cell comparatively lower precent error.
- These findings were robust across varying rates of noise infusion.
- Additional noise increased percent errors for disclosure metrics but the increase in percent errors was not expressive.