DS-GA 3001.009
Responsible Data Science
Lab 8

Center for Data Science

Data Profiling

What is Data Profiling?

- Data profiling is the set of activities and processes to determine the metadata about a given dataset.

- Data profiling involves:
  - Collecting descriptive statistics like min, max, count and sum.
  - Collecting data types, length and recurring patterns.
  - Tagging data with keywords, descriptions or categories.
  - Performing data quality assessment, risk of performing joins on the data.
  - Discovering metadata and assessing its accuracy.
  - Identifying distributions, key candidates, foreign-key candidates, functional dependencies, embedded value dependencies, and performing inter-table analysis.

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Understand your Data!

CRA

Computing Research Association

COMPUTING COMMUNITY CCC CONSORTIUM

“Given the heterogeneity of the flood of data, **it is not enough merely to record it and throw it into a repository.** Consider, for example, data from a range of scientific experiments. If we just have a bunch of data sets in a repository, it is **unlikely anyone will ever be able to find, let alone reuse,** any of this data. With adequate **metadata**, there is some hope, but even so, challenges will remain due to differences in experimental details and in data record structure.”

https://cra.org/ccc/wp-content/uploads/sites/2/2015/05/bigdatawhitepaper.pdf

Understand your Data!

- Need **metadata** to:
  - enable data **re-use** (have to be able to find it!)
  - determine **fitness for use** of a dataset in a task
  - help establish **trust** in the data analysis process and its outcomes
  - A set of activities and processes to determine the metadata about a given dataset
  - Metadata summarizes the data, summaries should be **small** but **informative**.

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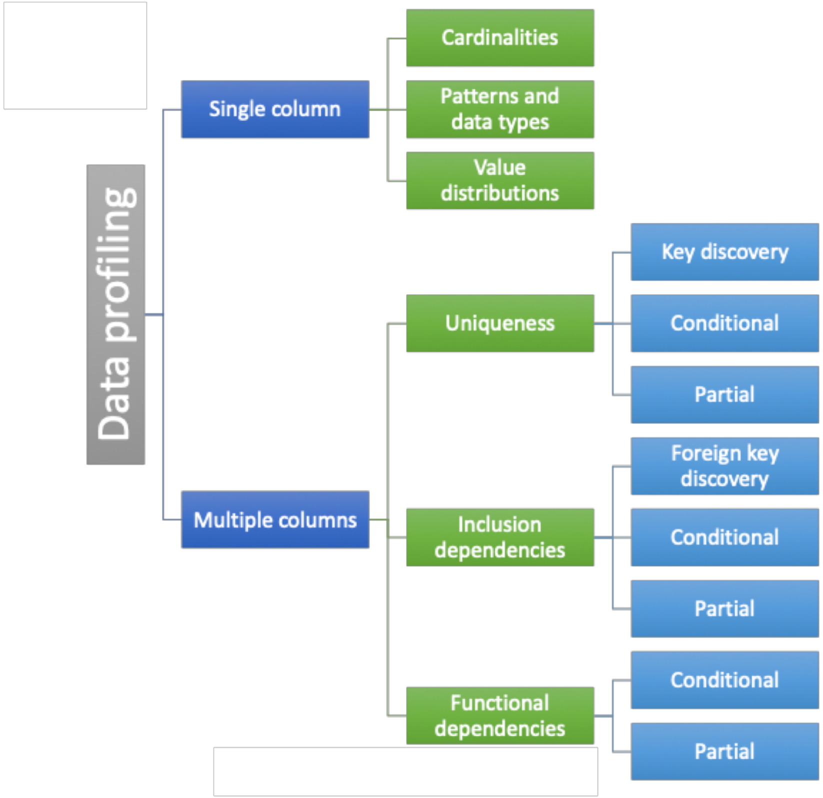
Classification of Profiling tasks



[Abedjan, Golab, Naumann; SIGMOD 2017]

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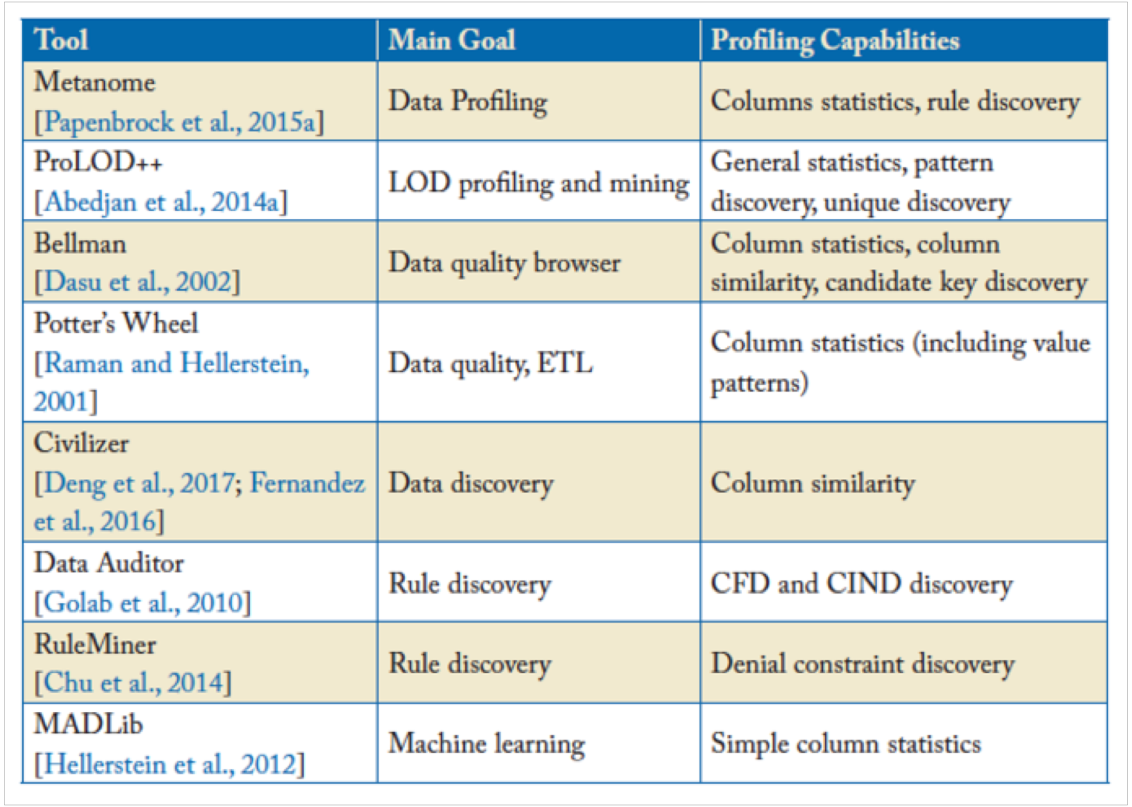
Research tools for Data Profiling



Tool	Main Goal	Profiling Capabilities
Metanome [Papenbrock et al., 2015a]	Data Profiling	Columns statistics, rule discovery
ProLOD++ [Abedjan et al., 2014a]	LOD profiling and mining	General statistics, pattern discovery, unique discovery
Bellman [Dasu et al., 2002]	Data quality browser	Column statistics, column similarity, candidate key discovery
Potter's Wheel [Raman and Hellerstein, 2001]	Data quality, ETL	Column statistics (including value patterns)
Civilizer [Deng et al., 2017; Fernandez et al., 2016]	Data discovery	Column similarity
Data Auditor [Golab et al., 2010]	Rule discovery	CFD and CIND discovery
RuleMiner [Chu et al., 2014]	Rule discovery	Denial constraint discovery
MADLib [Hellerstein et al., 2012]	Machine learning	Simple column statistics

[Abedjan, Golab, Naumann; SIGMOD 2017]

Questions?

Thank you