Discovering Nulls and Outliers

DS-1004 Big Data

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MINIMIZERS

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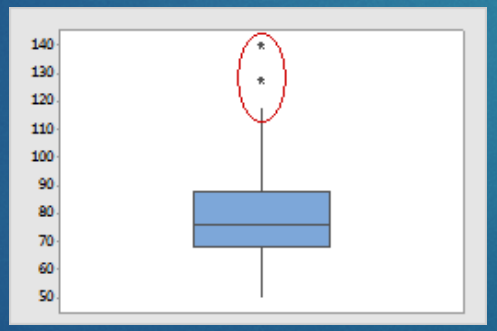
https://github.com/ranamihir/big_data_project

INTRODUCTION

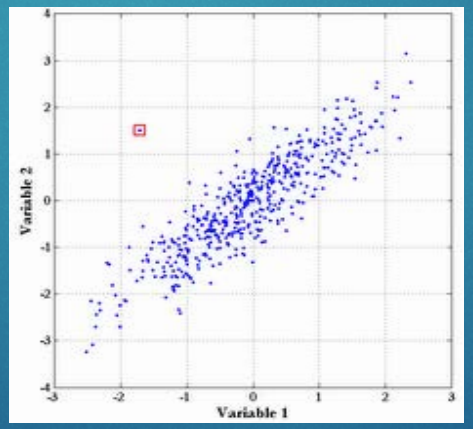
- Problem Statement:
  1. Null Value Detection
  2. Outlier Detection
     - Univariate outliers
     - Multivariate outliers
- Data Set Collection:
  - NYC Open Data
  - 50 data sets

PROBLEM FORMULATION

1. Data Cleaning
   - "$1.99" → 1.99, "1,000" → 1000, 10003 → "10003" (zip code)
2. Missing Value Treatment
   - "None", "N/A", " ", "-", "-999", "999", etc.
3. Outliers



Source: link



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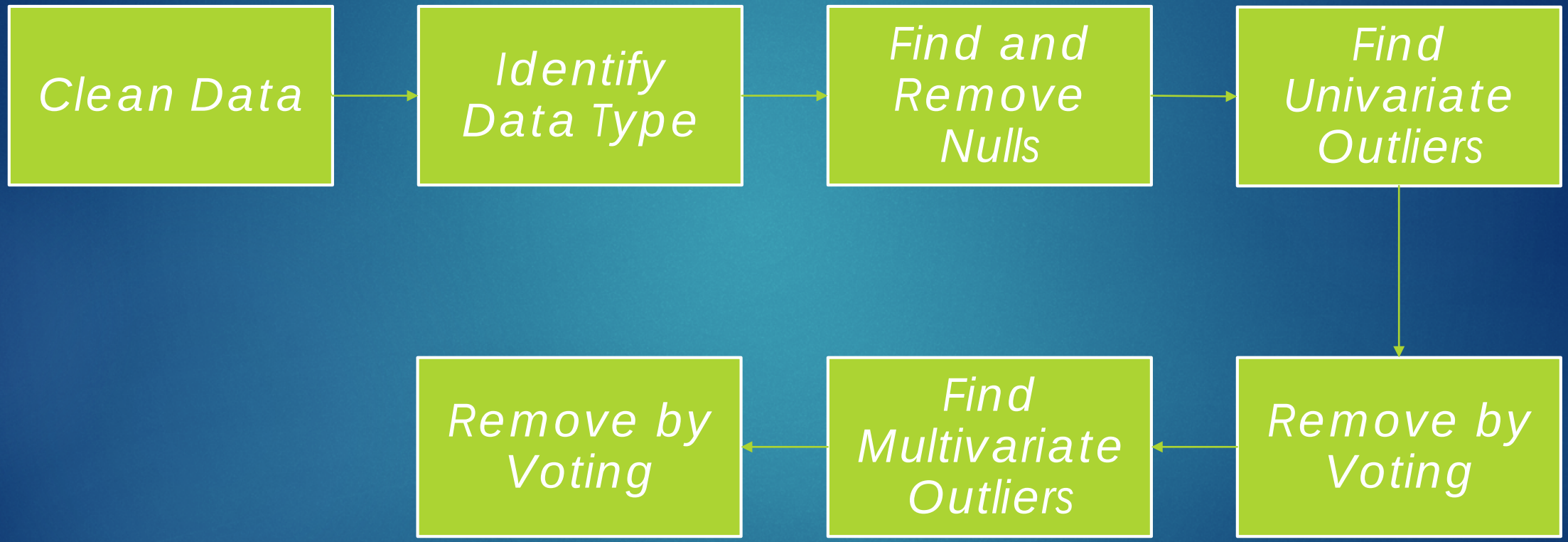
METHODOLOGY



OUTLIER DETECTION

- *Nearest Neighbor based*
  - *DBSCAN*
- *Clustering based*
  - *k-Means*
- *Mixture of Parametric Distributions*
  - *Gaussian Mixture Models*

OUTLIER DETECTION

- Non-Parametric
  - Histogram / frequency – based
- Statistical Anomaly based
  - Box plot Rule
  - Gaussian model based (z-score)
  - Other Probabilistic models (Beta, Gamma, etc.)

KEY STRENGTHS

- End-to-end automated framework
- Box plot Rule at core
  - No input specific to particular data set / column required
- Robust
  - Multiple techniques optimizing different metrics
  - Voting / Intersection of multiple similar techniques
- Efficient
  - Remove univariate outliers before finding multivariate ones

RESULTS

Column	Value
brooklyn_condominiums_comparable_properties_address	"UNKNOWN"

Data: bss9-579f.tsv

DBSCAN results
(pickup_latitude, pickup_longitude)
Data: ghpb-fpea.tsv

Summary	num_level_3
count	5302
mean	239.776
stddev	267.144
min	0.0
max	2020.0

rid	num_level_3
847	1386.0
851	1434.0
963	1337.0
990	1344.0
1493	1522.0

Data: usap-qc7e.tsv

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