CLEMI

CLustering to Evaluate Multiple Imputation

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Outline

1. Introduction
2. Imputation
3. Benchmark
4. Evaluating Imputation
5. Discussion

Content

1 Introduction

2 Imputation

3 Benchmark

4 Evaluating Imputation

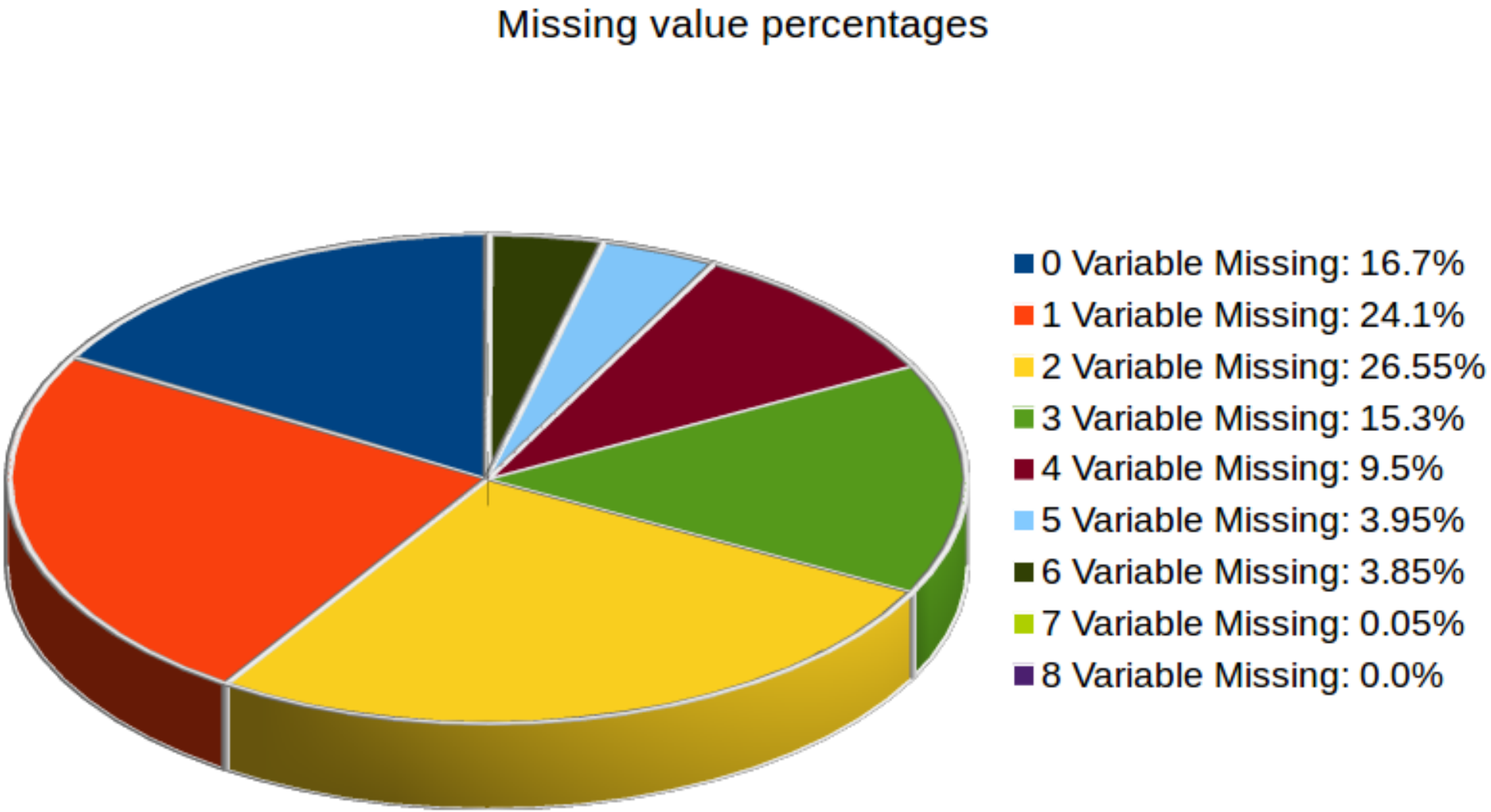
5 Discussion

Introduction

Motivation:

- Routinely acquired data has large amounts of missing data
- Most researchers carry out complete case analyses
- Need to use as much of the available data as possible.
- Need something every researcher can trust
- A way to evaluate imputation
- Must be user friendly to most researchers (no need for a computing degree)

Missing Values in Raw Data



Introduction

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Current Work

Imputation:

- Statistical Software (SPSS, R, StatSol)
- Mean Impuation, Multiple Imputation
- MICE: Multivariate Imputation by Chained Equations

Evaluation:

- No generalisation
- Nothing
- Zilch

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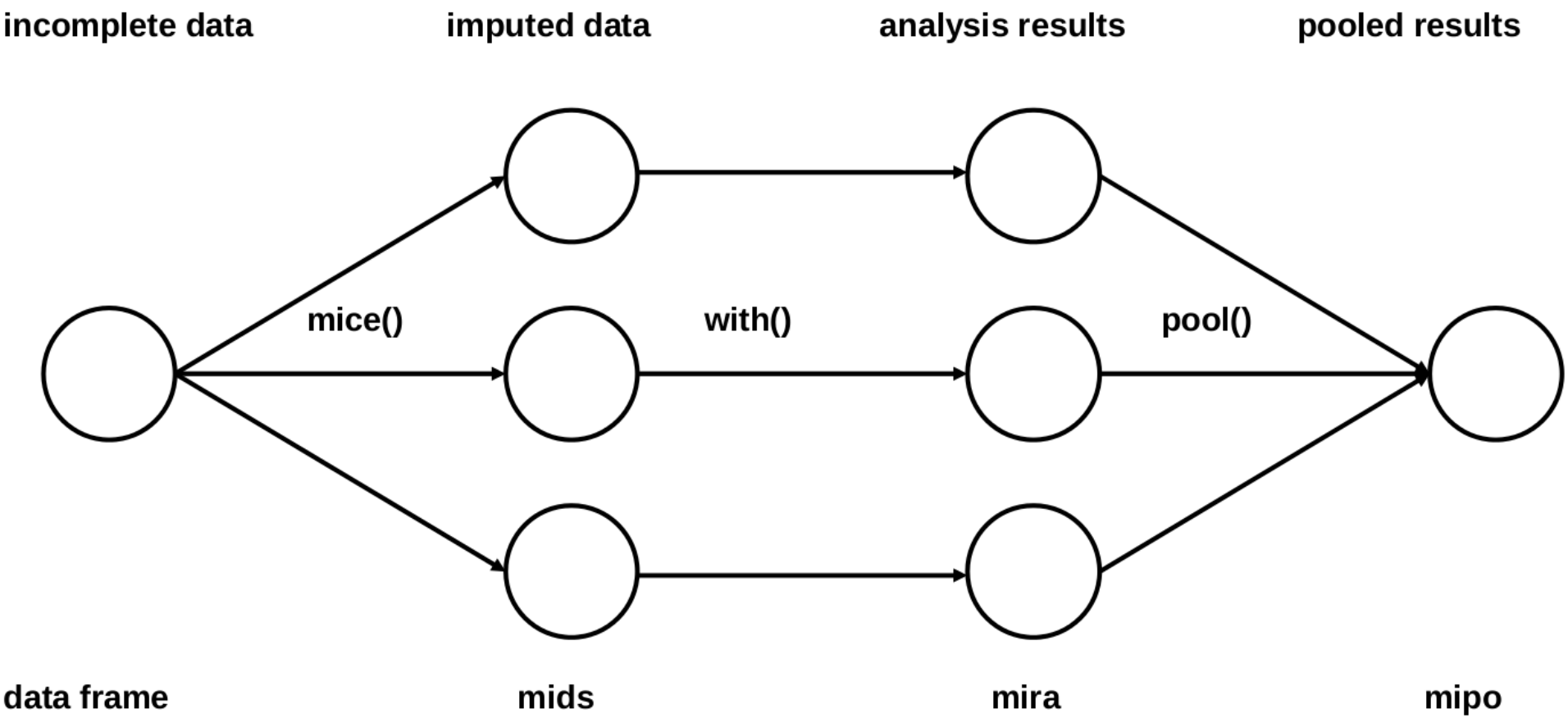
Imputation - MICE

MICE - Multivariate Imputation by Chained Equations

- Uses the whole dataset
- Preserved the relations in the data
- Can work with longitudinal data

Imputation ctn.

Journal of Statistical Software



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Benchmarks

- Needed to see effects of imputation
- Needed for a controlled test
- They are suppose to represent the truth

Benchmarks

How to create a benchmark:

- Extract complete cases
- Analyse missingness in original dataset
- Create copies of the complete cases and apply missingness
- Every mini-me is a replica of the original dataset but from the benchmark.

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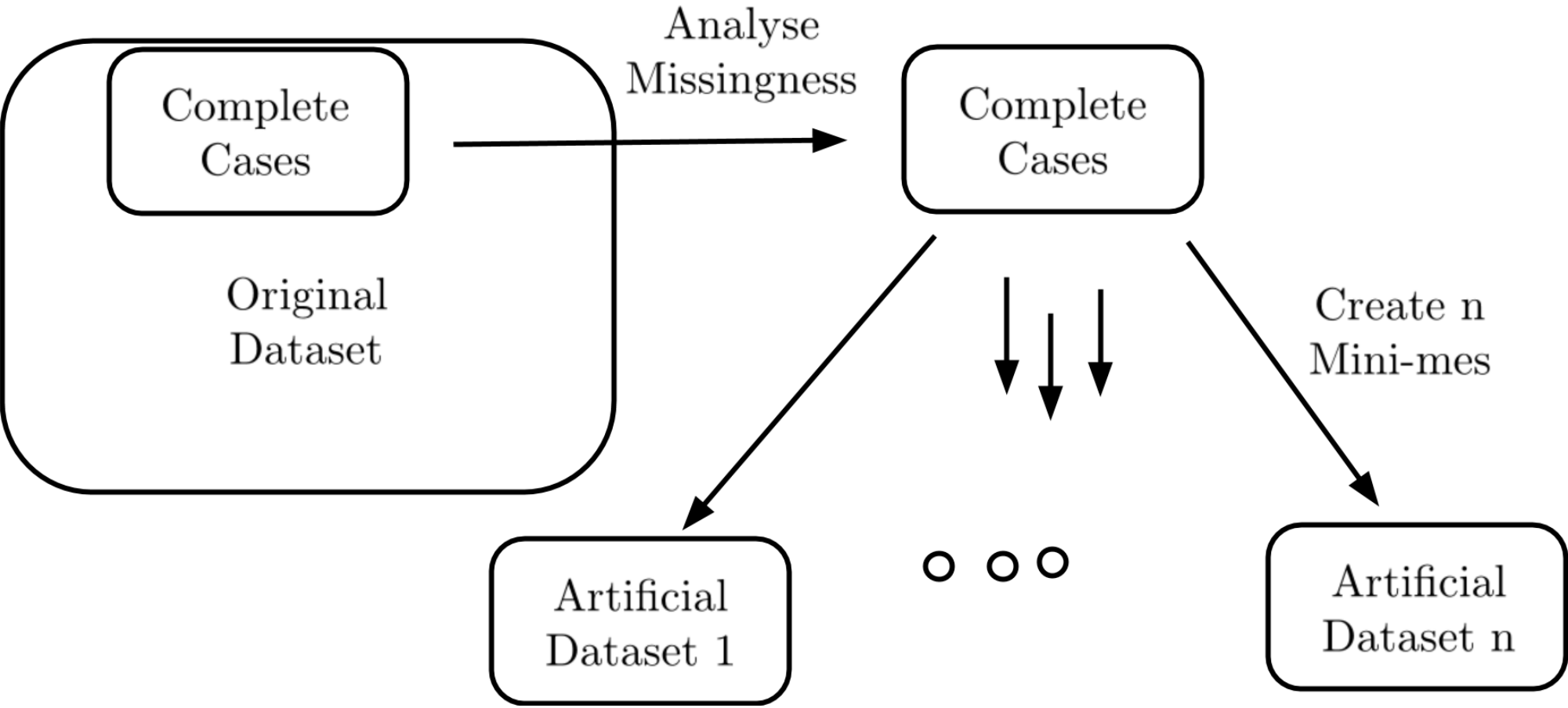
Impute Artificially Incomplete Datasets

Apply MICE to all mini-me:

- Need to minimise uncertainty
- Apply to multiple datasets
- Exact same method on all datasets

Re-Cap

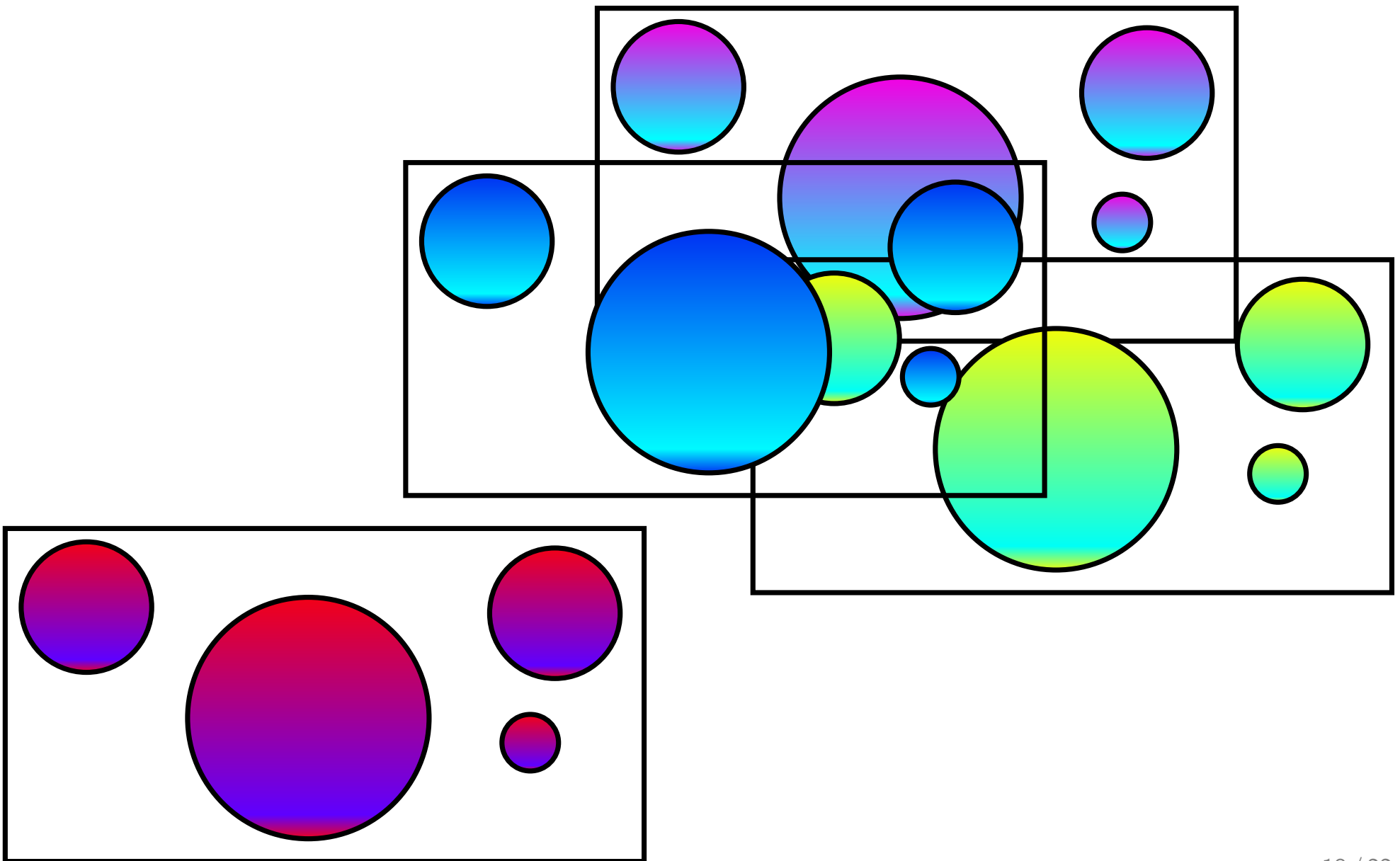

Complete Cases
Original Dataset
Analyse Missingness
Complete Cases
Create n Mini-mes
Artificial Dataset 1
Artificial Dataset n

Evaluation

Clustering:

- Group objects into a sets with similar objects
- Unsupervised
- Good for higher dimensional data (Big Data)

Evaluation ctn.



Evaluation ctn.

Clustering:

- Get relevant clustering characteristics
- Compare imputed datasets to benchmark to see the effects
- Mean imputation as a reference

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Discussion & Conclusion

Limitations

- Output is subjective
- Some may over-interpret the results
- What if the complete subset is too small

Outcomes

- Optimised number of ignored records
- Compare different imputation methods
- Optimize imputation features

To Consider

- Use a modelling to verify the outcome
- Use any imputation method

Thanks & Questions

Thanks for your attention!
Question & Comments