On the exploration of high cardinality categorical data

Martijn Tennekes, Edwin de Jonge

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Tableplot

- Innovative data visualisation method
- One picture of a multivariate BIG data source
- Bottom up method:
  1. Sort records on a key variable
  2. Group records into equally sized bins
  3. Calculate per group:
     - numeric variable: mean value
     - categorical variable: category fractions
  4. Plot:
     - numeric variable: bar chart
     - categorical variable: stacked bar chart
- Implementation: R package *tabplot*

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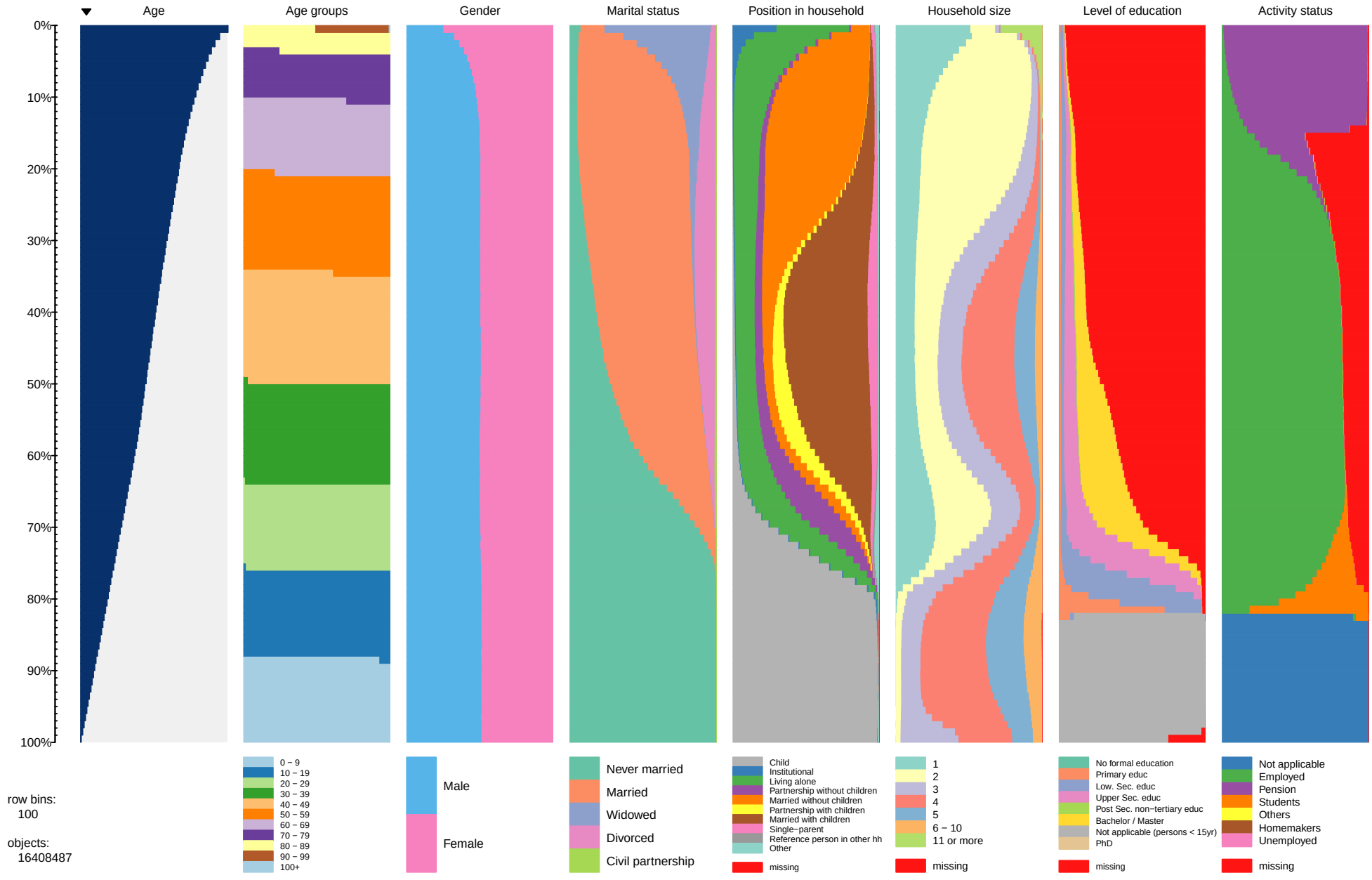
Tableplot: Virtual Census



row bins:
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objects:
16408487

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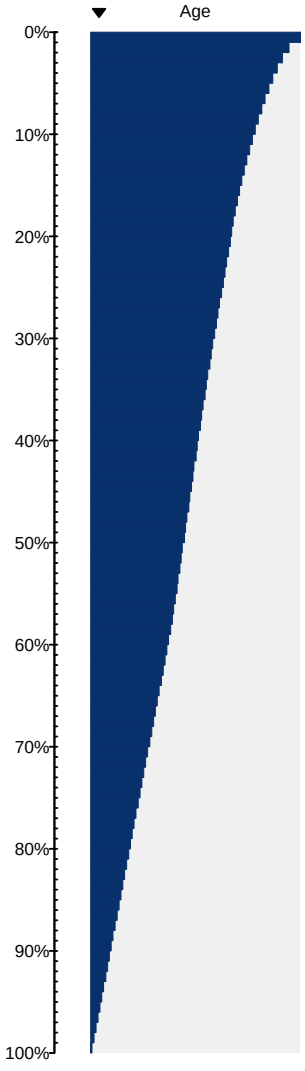

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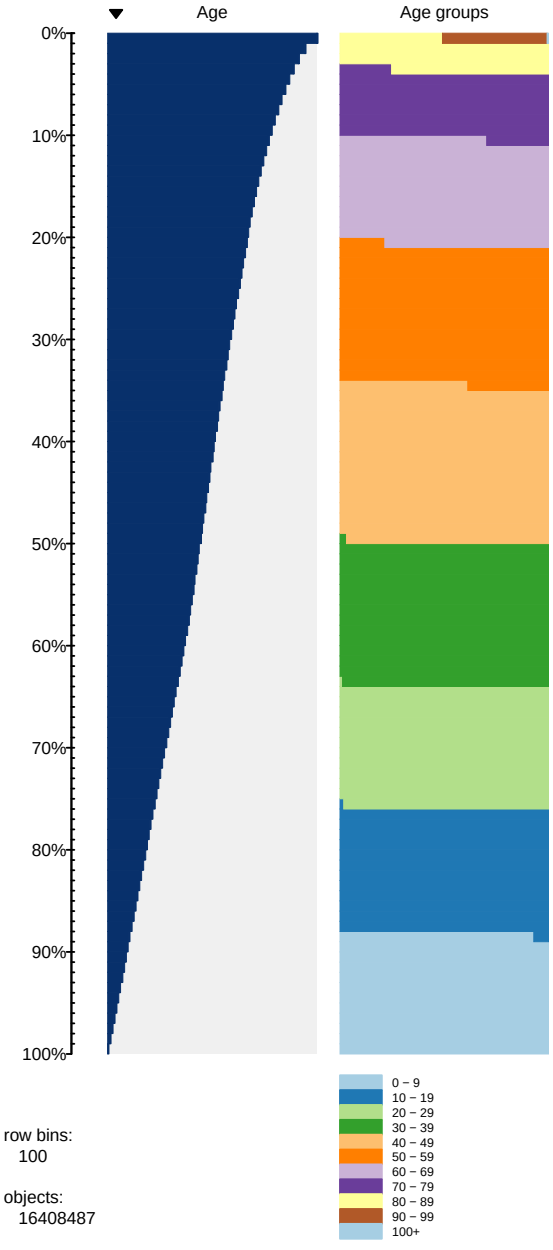

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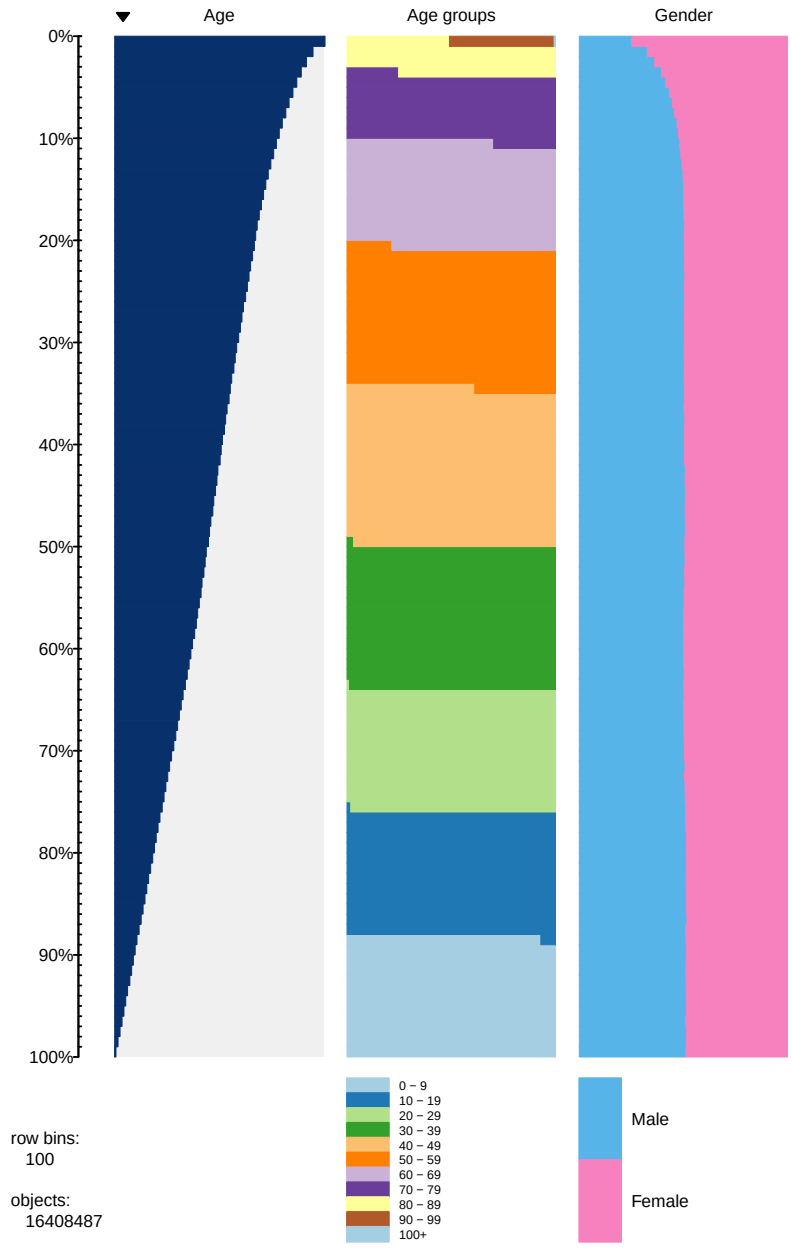

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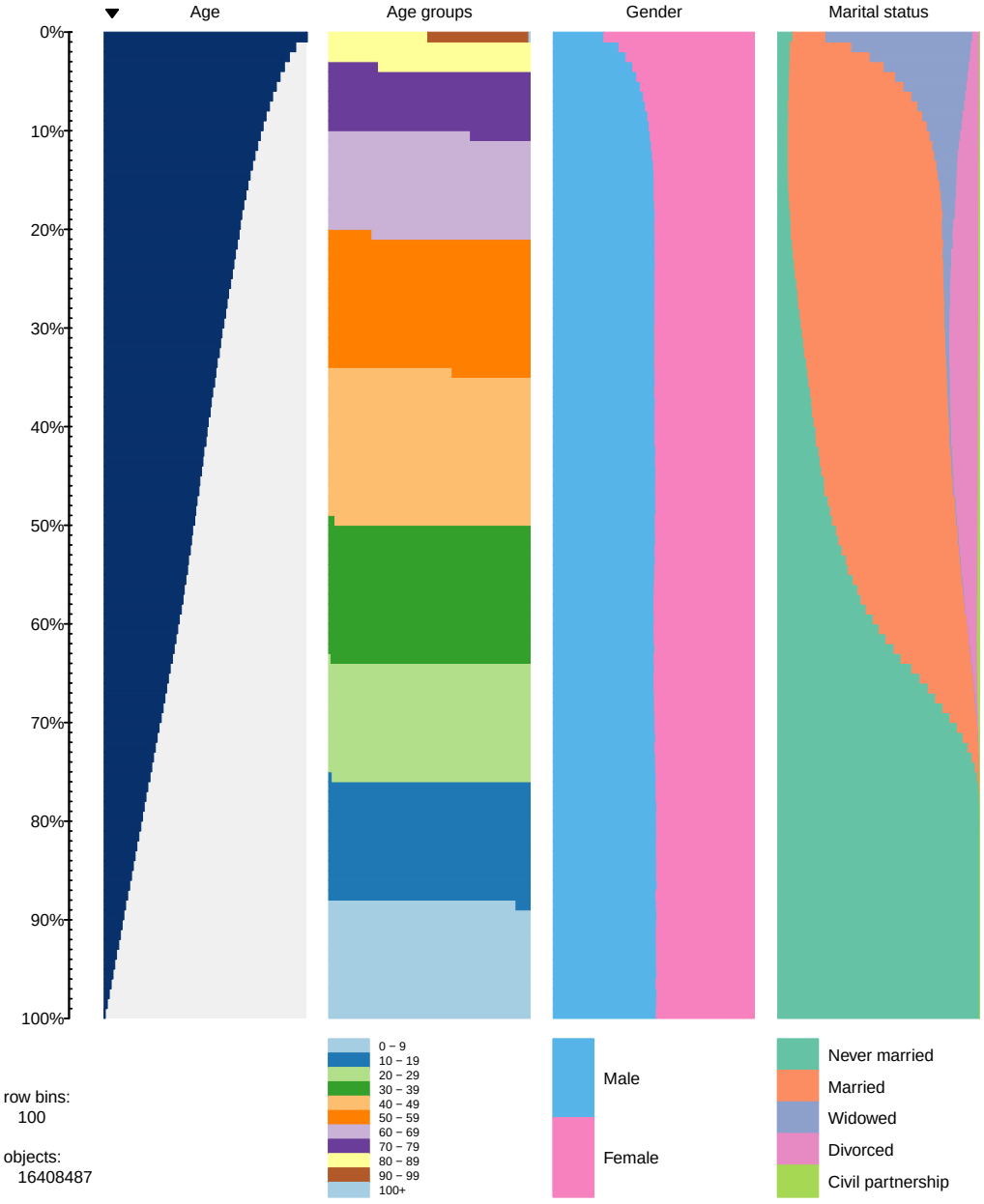

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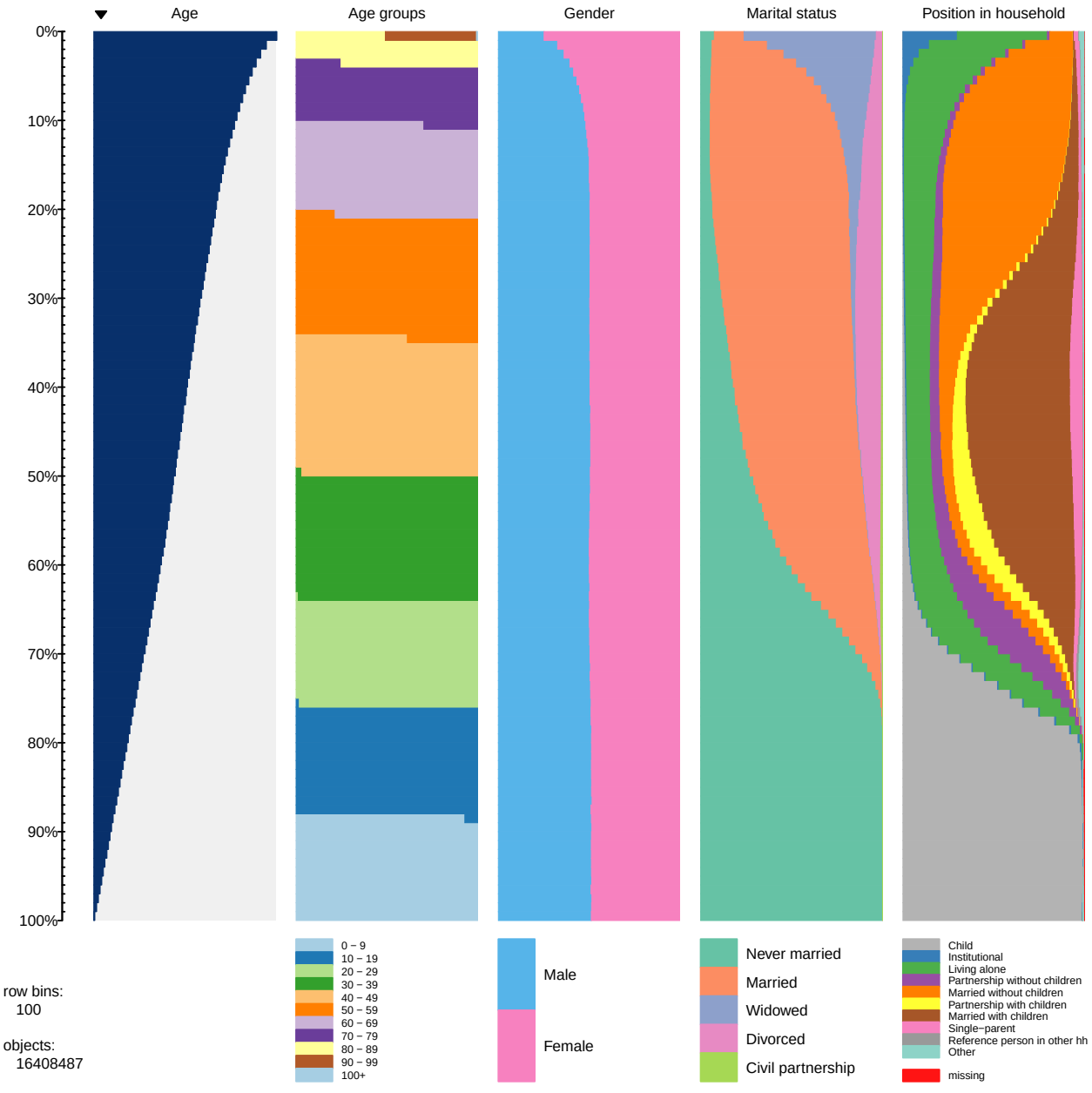

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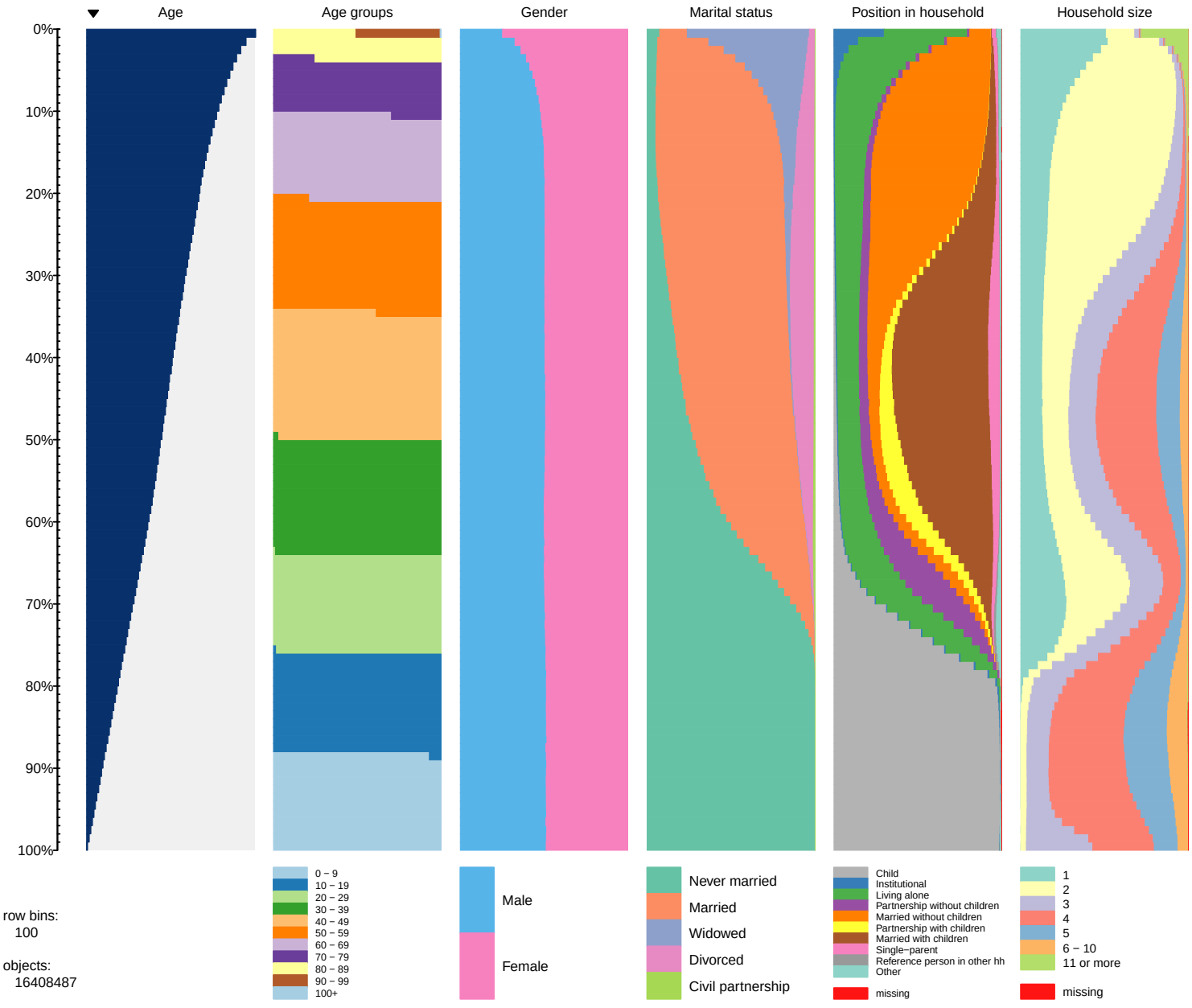

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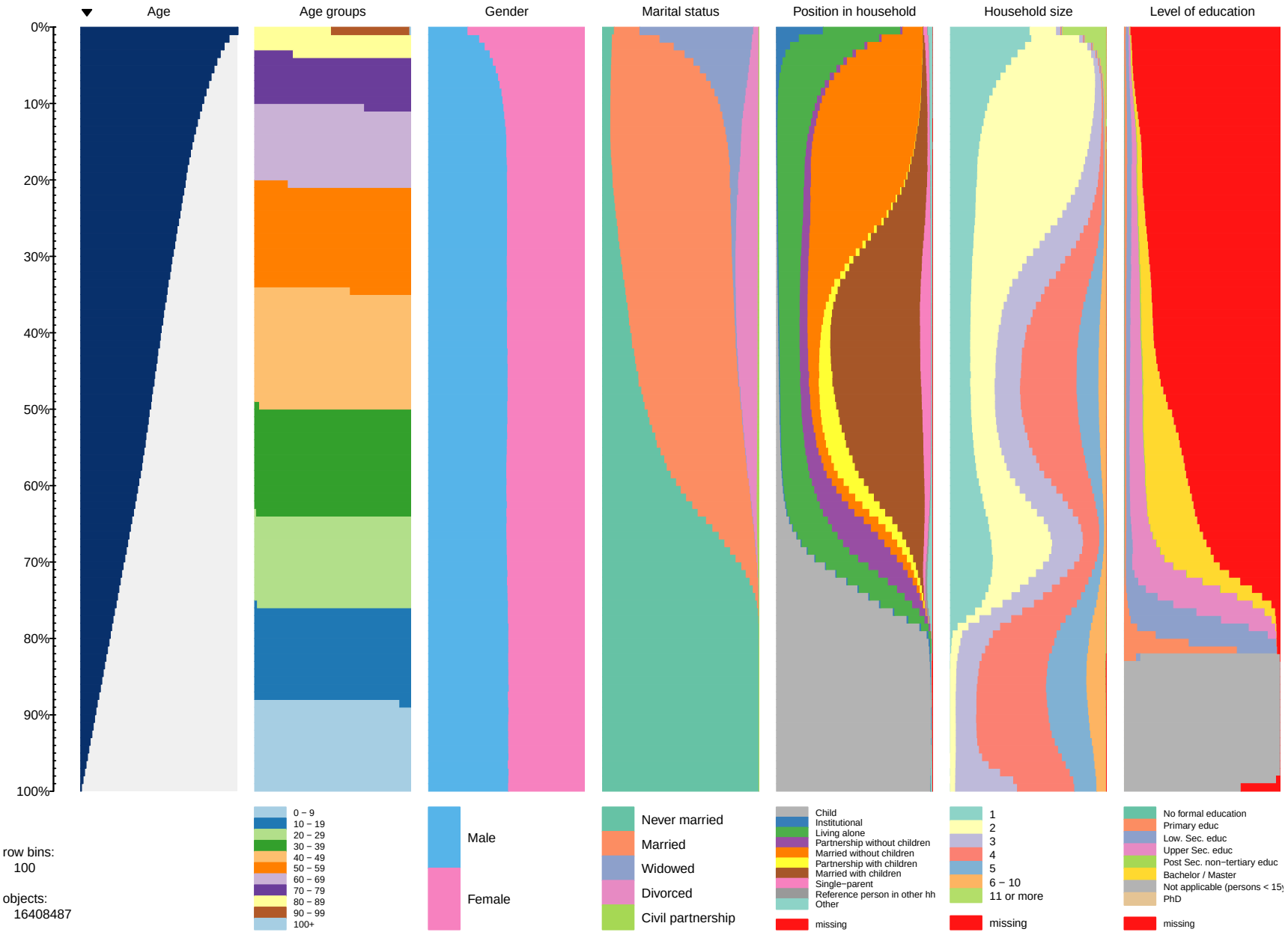

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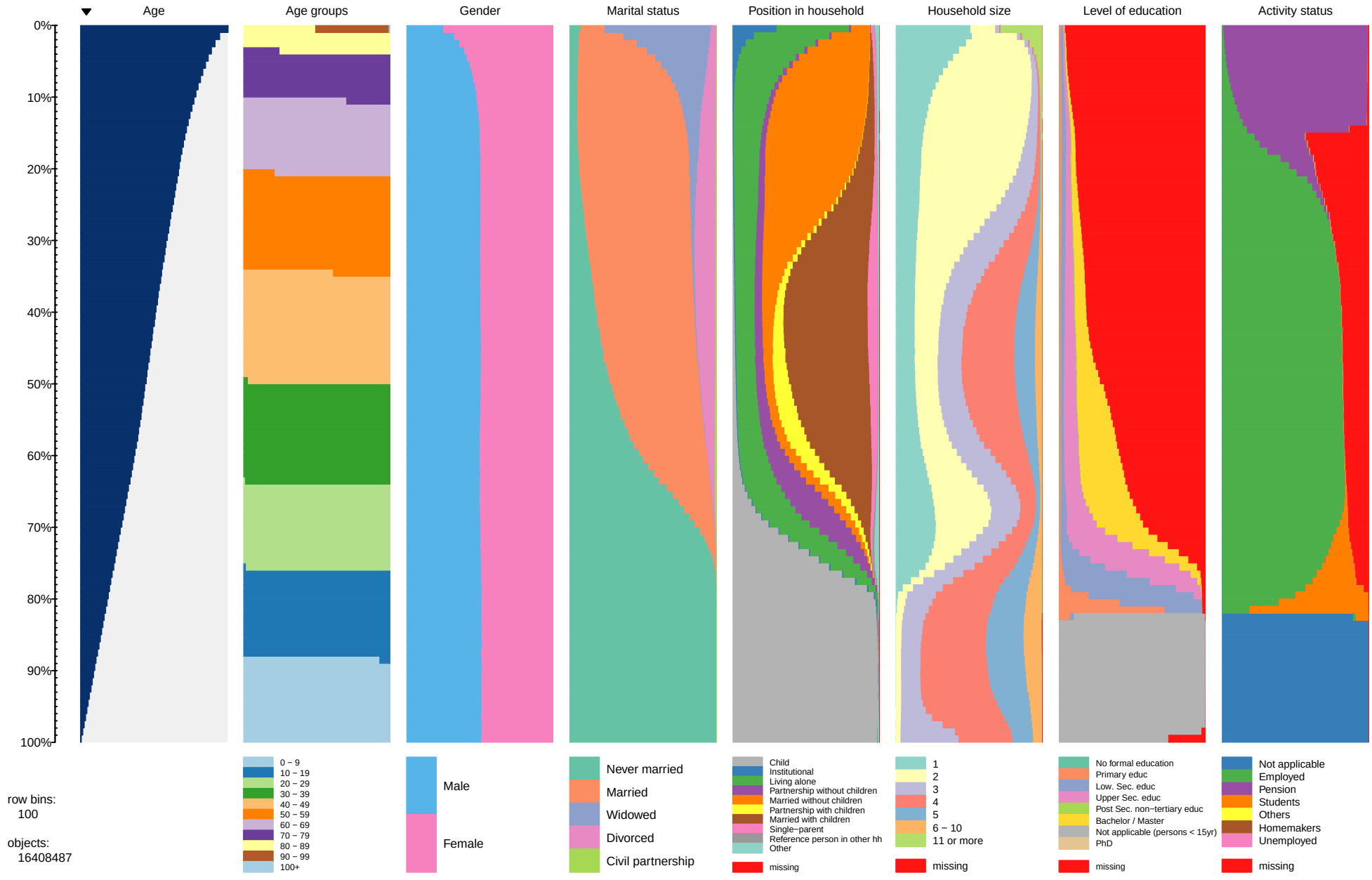

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Case 1: a couple of categories

- Determine frequencies of each category
- Assign the categories to a qualitative colour palette
- Plot a stacked bar chart column

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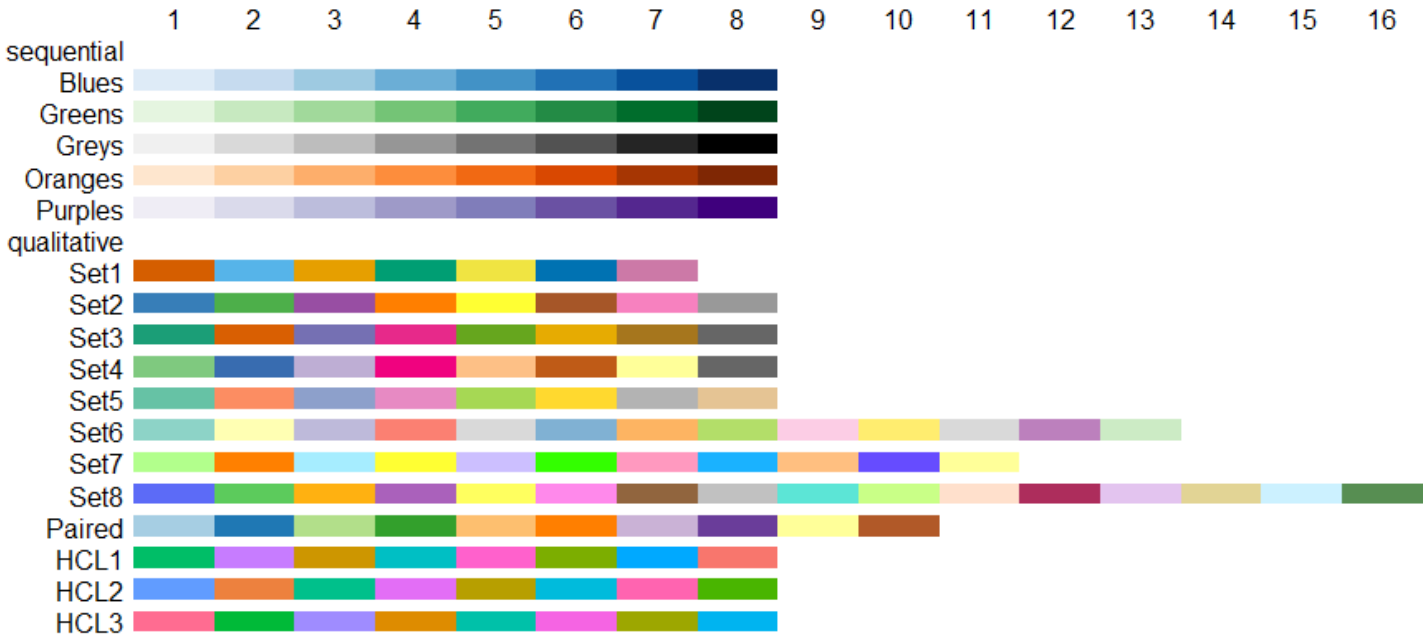

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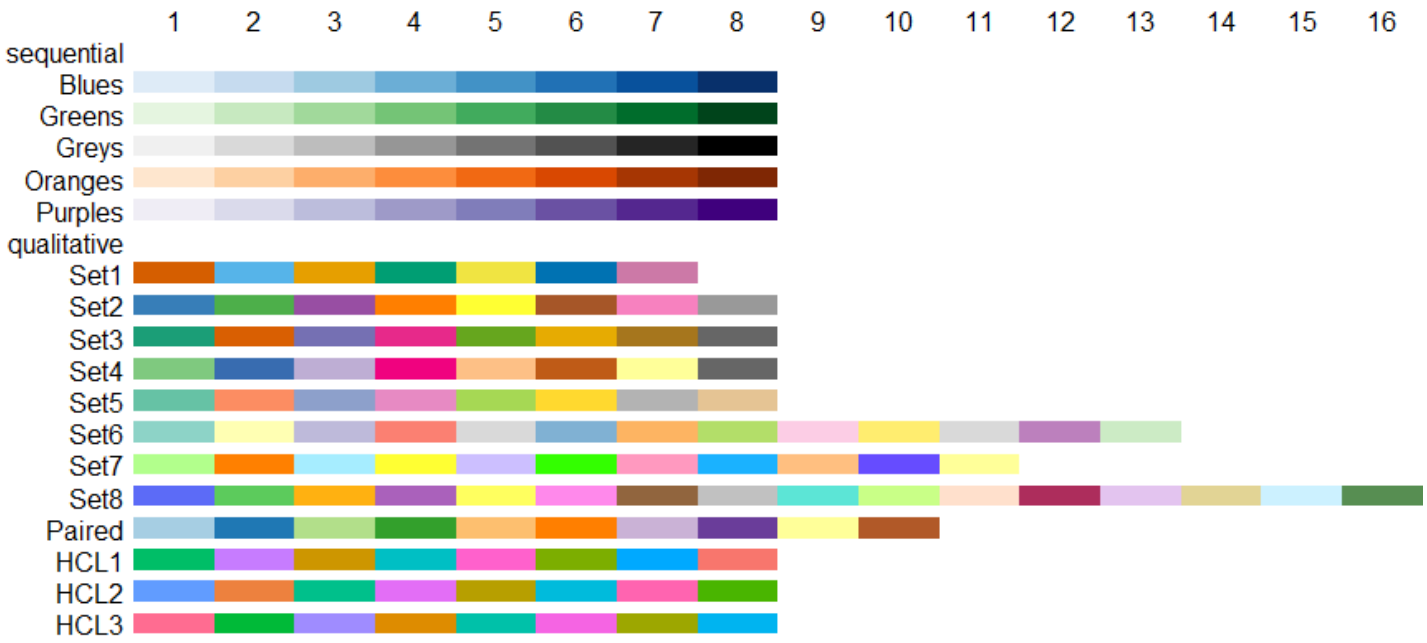

Categorical data

Case 2: many categories (high cardinality)

- Examples: NACE code, education classification
- Not straightforward to plot:
  - Plot all categories? Or cluster them?
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  - Legend space is limited

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Clustering categories

- Needed: a proper aggregation scheme
  - Ordered variable: bin the categories
  - Hierarchical variable: highest level
- Be careful! Important details may not be noticed

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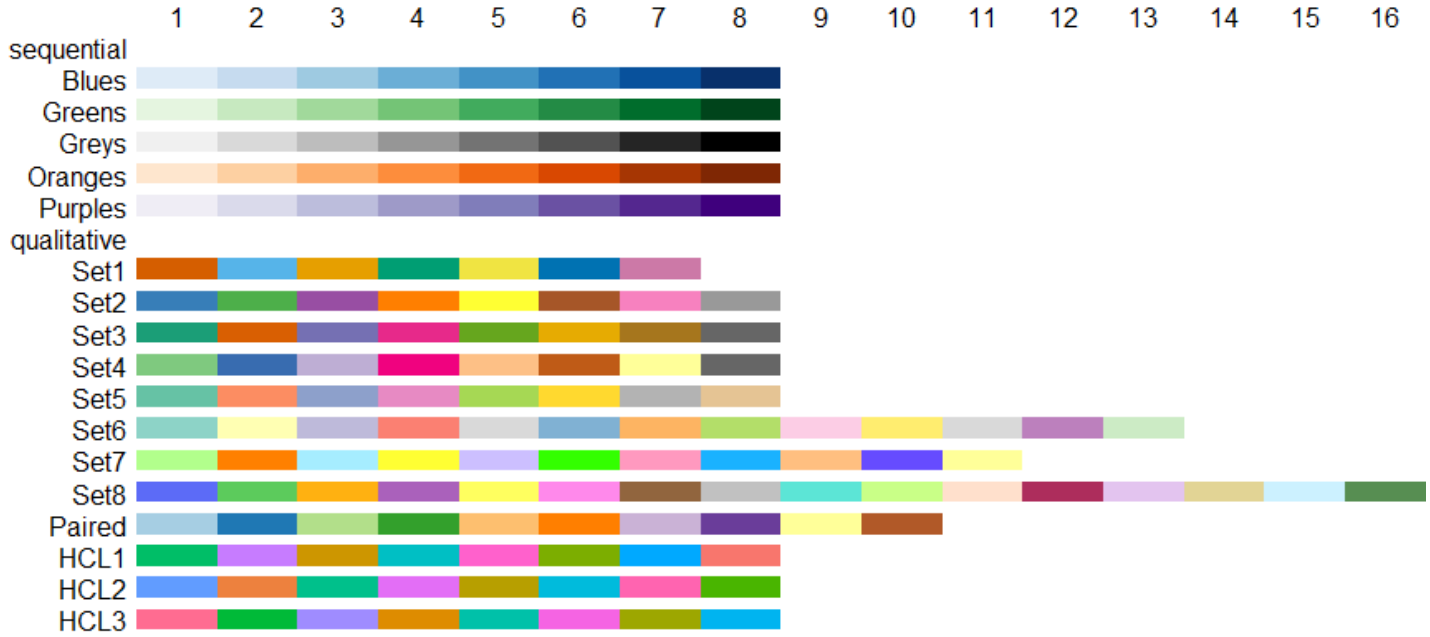
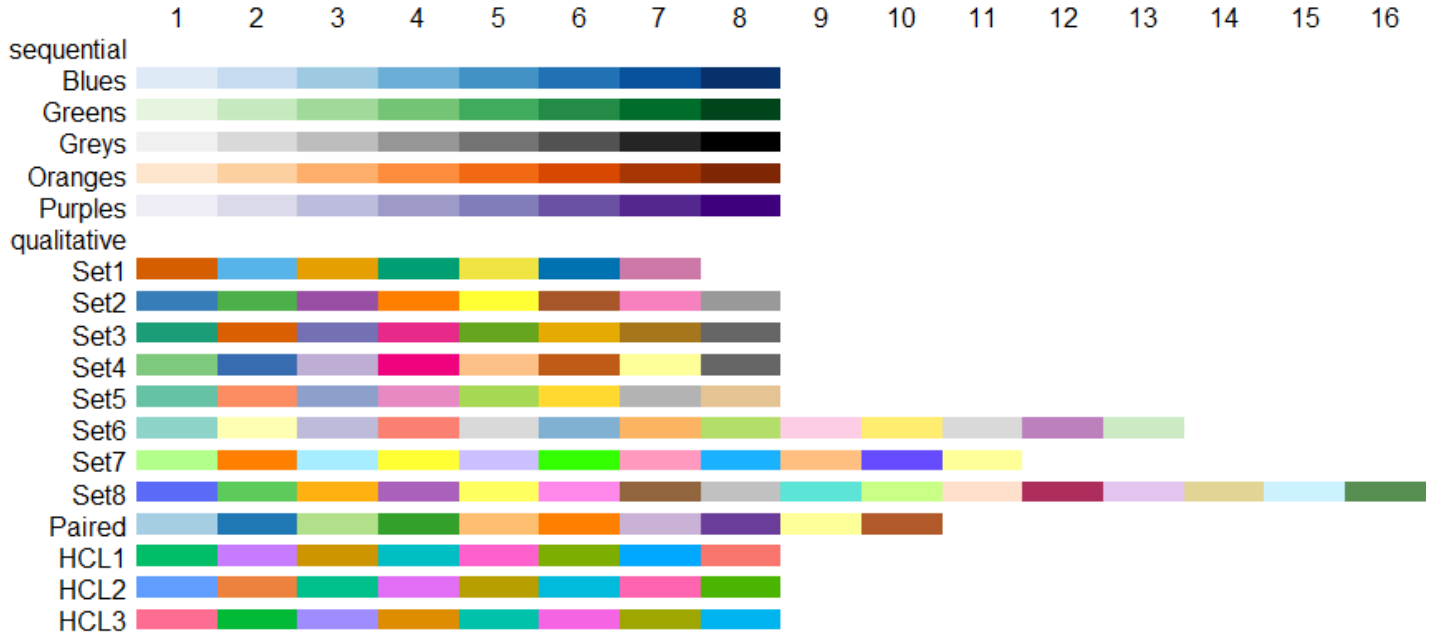


- Not enough colours for > 16 categories
- Create rainbow colour palette:

Category colours



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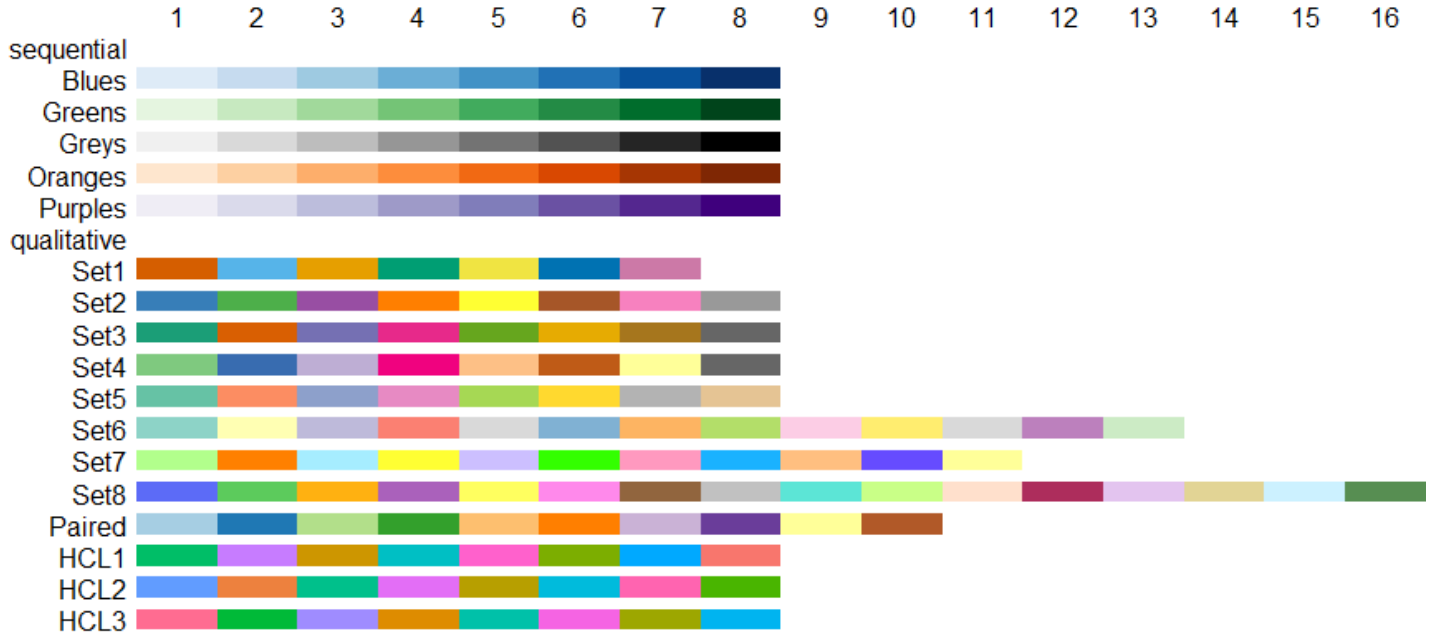

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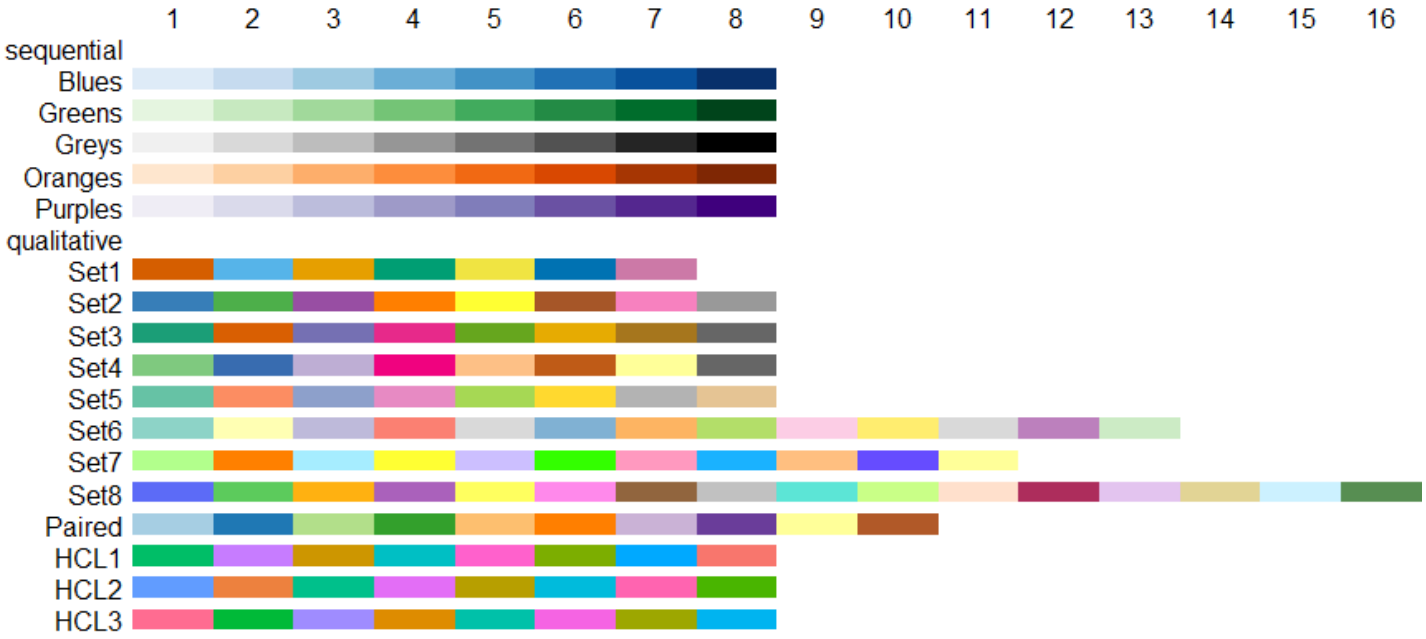

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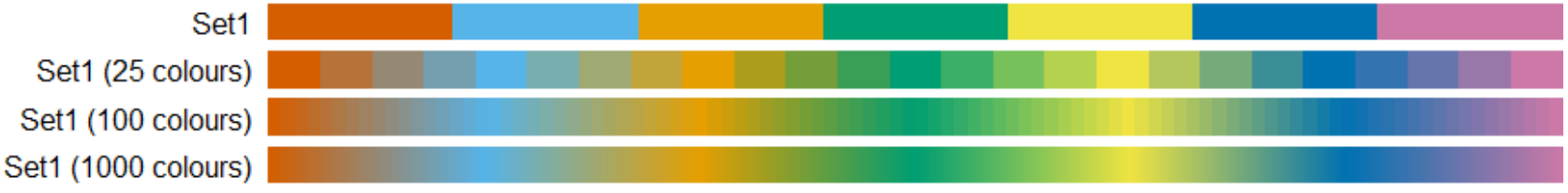

Method

Two techniques:

i. Clustering categories

ii. Rainbow palette

Can be used together

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R package tabplot

Arguments regading categorical data:

- max_levels (default=50): maximum number of categories. If number of categories $>$ max_levels, then they are automatically clustered to max_levels groups.
- pals: list of palettes
- change_palette_type_at (default=20): determines when a palette is repeated or when a rainbow palette is made
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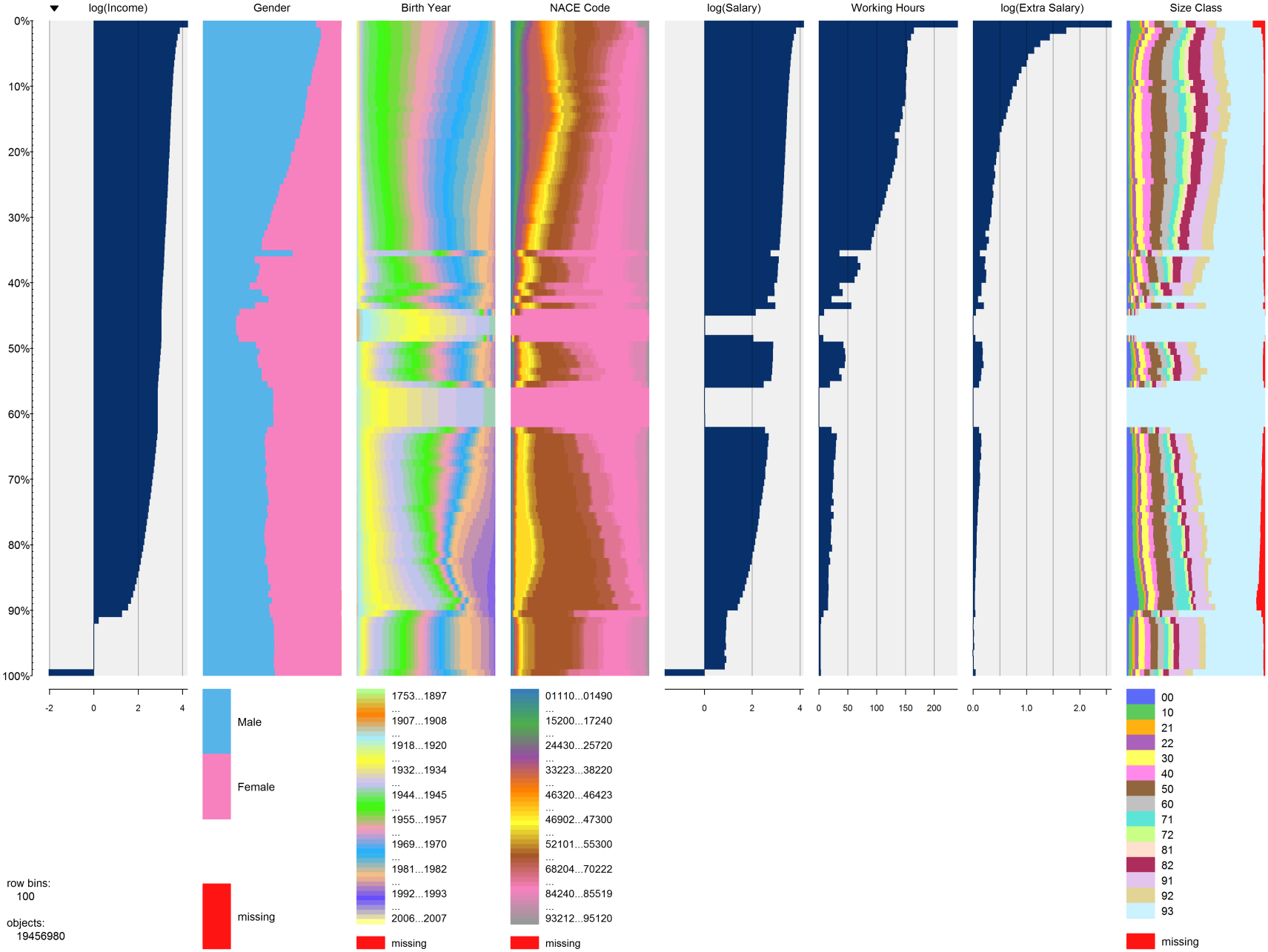

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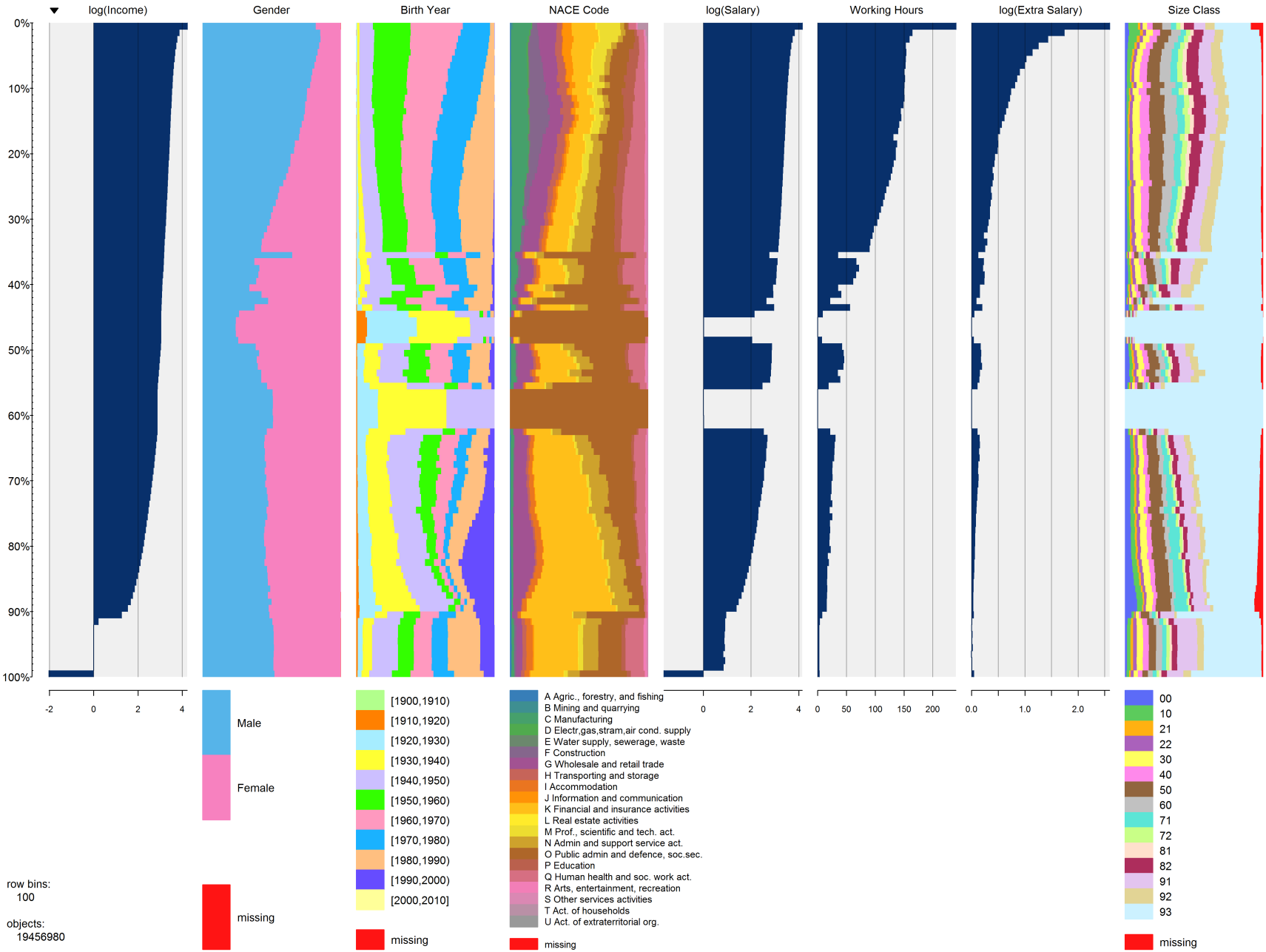

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objects:
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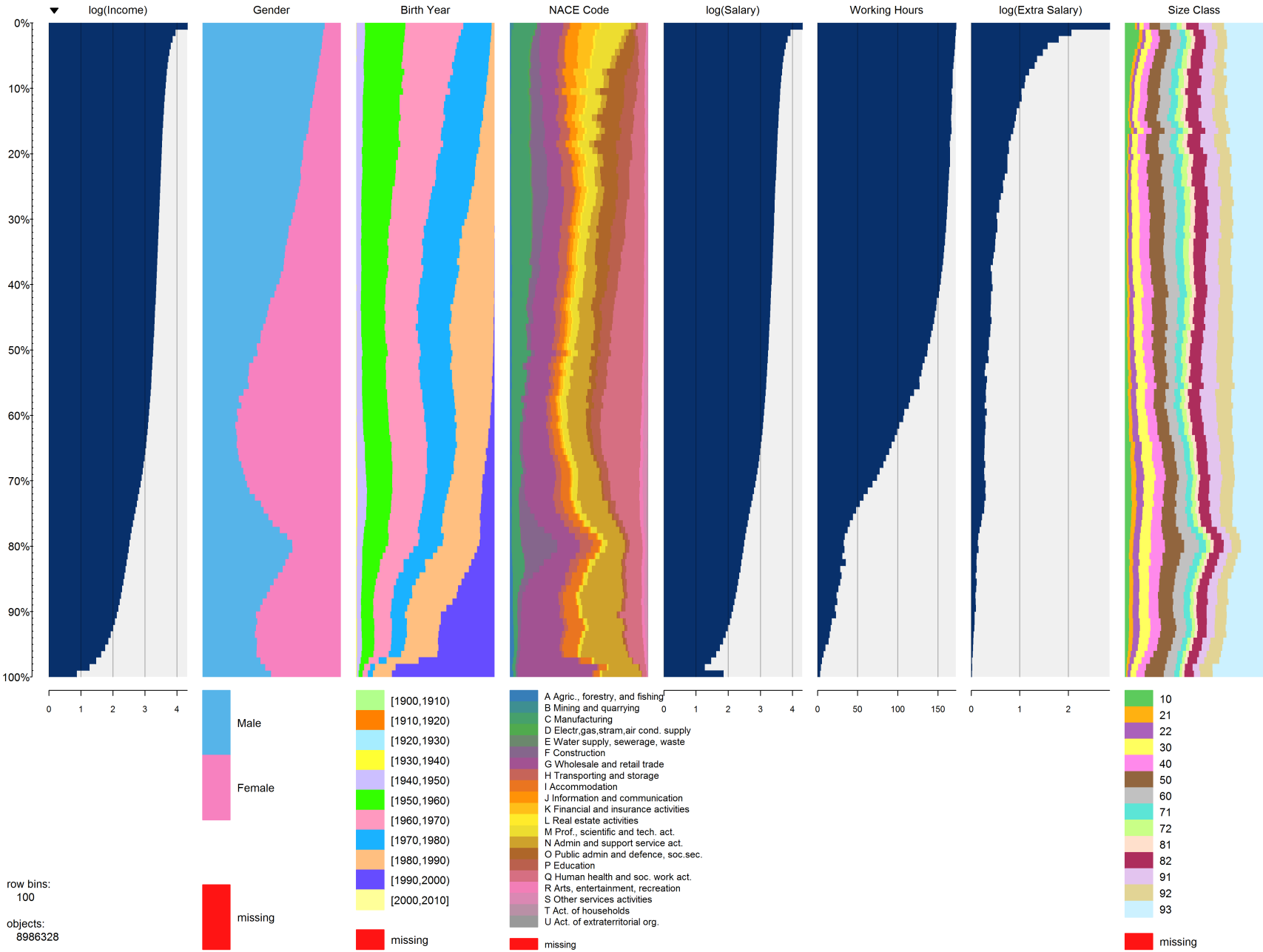

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objects:
8986328

Concluding remarks

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- Tennekes, M., Jonge, E. de, Daas, P.J.H. (2013) Visualizing and Inspecting Large Datasets with Tableplots, Journal of Data Science 11 (1), 43-58.
- R package *tabplot* is available on CRAN. Development site: code.google.com/p/tableplot/