Applied Data Analytics

# Statistics — Basics, location measuresocation measures / Pandas

## Types of data and data types

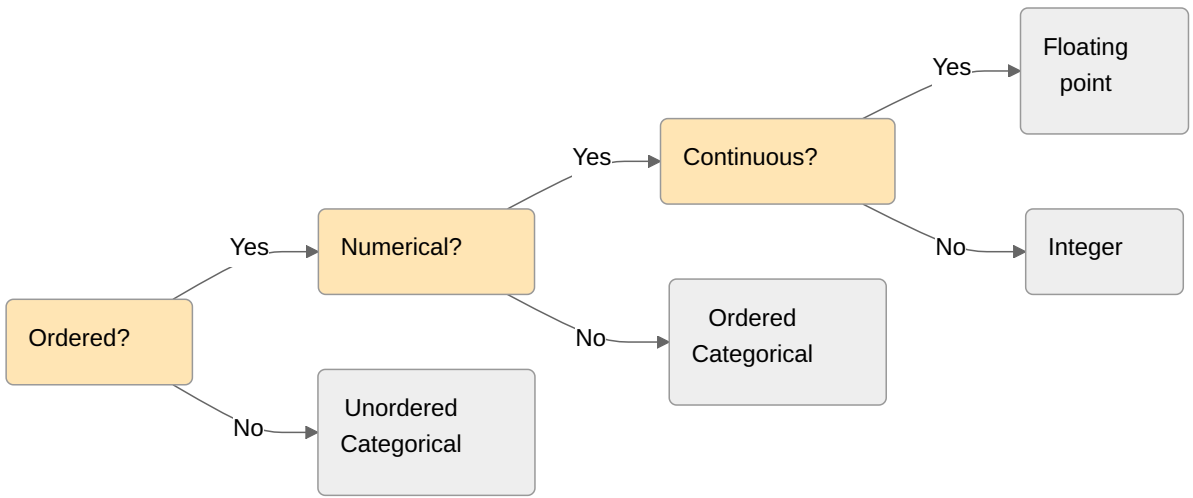
Hans-Martin von Gaudecker

# Nominal (qualitative, categorical) data

Example

- Variable: Country of origin
- Possible values: Names of countries in Latin America
- Observed values: Argentina, Bolivia, Argentina

# Decision tree



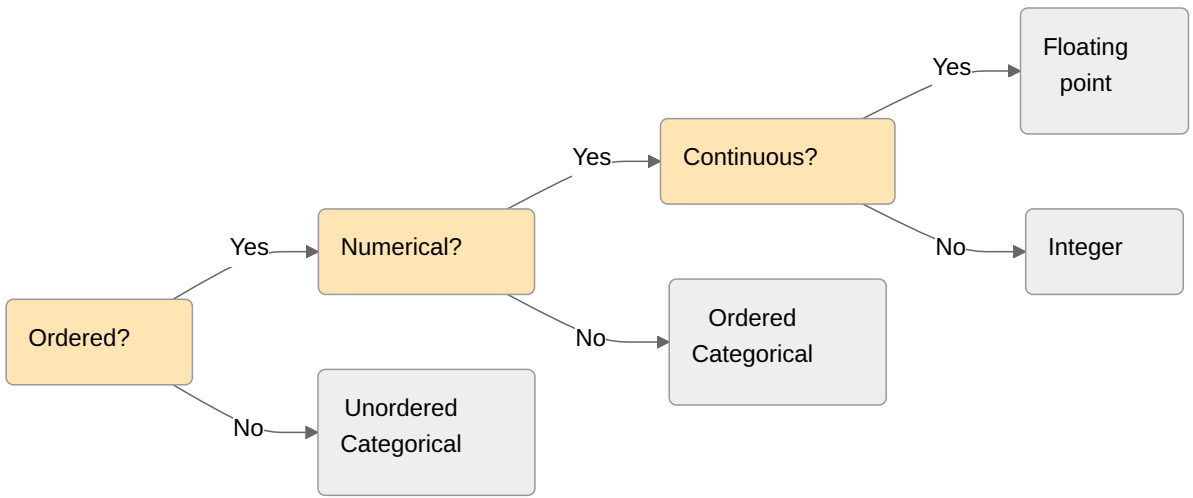
```
pd.Series(
  [
    "Argentina",
    "Bolivia",
    "Argentina",
  ],
  dtype=pd.CategoricalDtype(
    [
      "Argentina",
      ...
      "Peru",
    ],
    ordered=False
  )
)
```

# Cardinal, continuous data

Example:

- Variable: Annual Income in Euros
- Possible values: Positive real numbers
- Observed values: 42,345 €, 53,724 €, 28,734 €

# Decision tree



# Cardinal, continuous data

## Examples

Monetary quantities

Some utility measures

Weight

Lengths

Energy consumption

## Pandas data type

Floating point

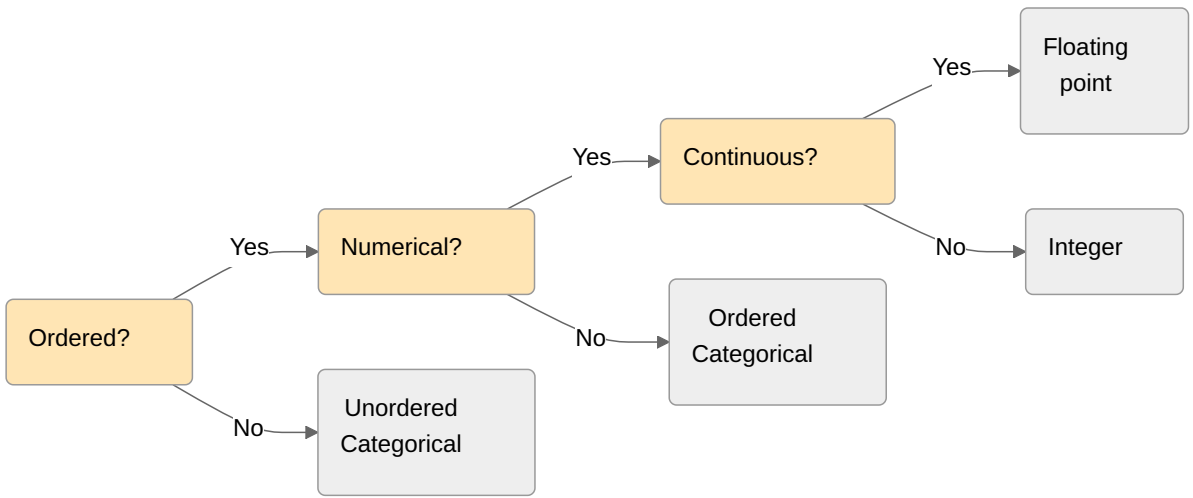
```
pd.Series(
  [
    42_345,
    53_724,
    28_734,
  ],
  dtype=float
)
```

# Cardinal, discrete data

Example:

- Variable: Age in years
- Possible values: 0, 1, 2, ...
- Observed values: 18, 22, 19

# Decision tree



# Cardinal, discrete data

## Examples

Age in years or months

Any count variable

*Depending on the typical number of outcomes, we may treat variables as quasi-continuous.*

## Pandas data type

Integer

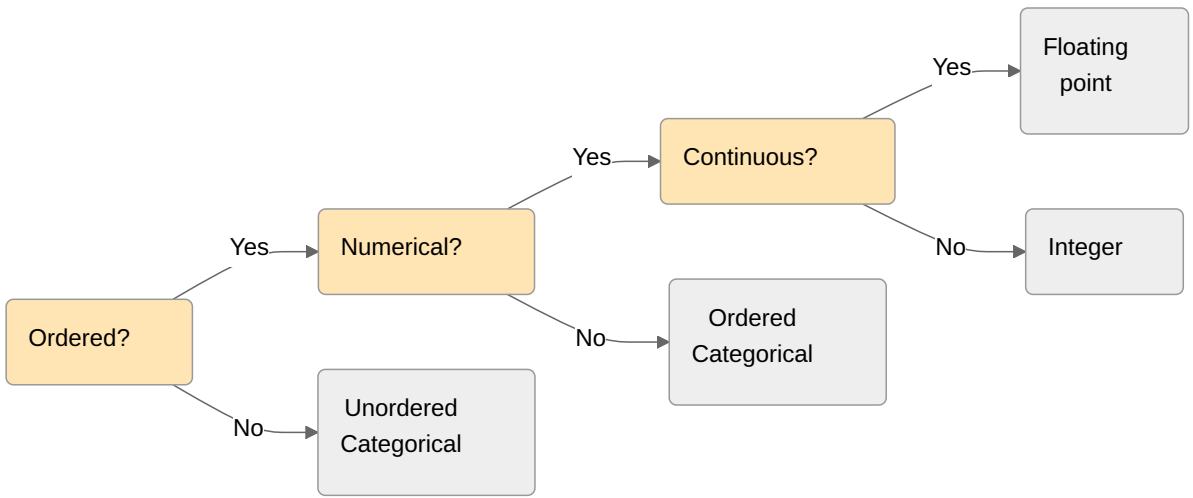
```
pd.Series(
  [
    18,
    22,
    19,
  ],
  dtype=int
)
```

# Ordinal, non-numeric data

Example:

- Variable: Annual Income in Euros, binned
- Possible values: $[0, 30000)$, $[30000, 60000)$, $[60000, \infty)$
- Observed values: $[30000, 60000)$, $[30000, 60000)$, $[0, 30000)$,

# Decision tree



# Ordinal, non-numeric data

## Examples

Binned cardinal data, whatever the label. Here:

- "low", "medium", "high"
- 0, 1, 2

Labelled Likert scales ("0 disagree", "1", "2", "3", "4 agree")

Highest degree obtained

Social status / class

## Pandas data type

Ordered categorical

```
pd.Series(
    [
        "[30000, 60000)",
        "[30000, 60000)",
        "[0, 30000)",
    ],
    dtype=pd.CategoricalDtype(
        [
            "[0, 30000)",
            "[30000, 60000)",
            "[60000, ∞)",
        ],
        ordered=True
    )
)
```

# Ordinal, numeric data

| Examples | Pandas data type |
| --- | --- |
| Unlabelled Likert scales | Ordered categorical |
| IQ | Integer |
| Some utility measures | Floating point |