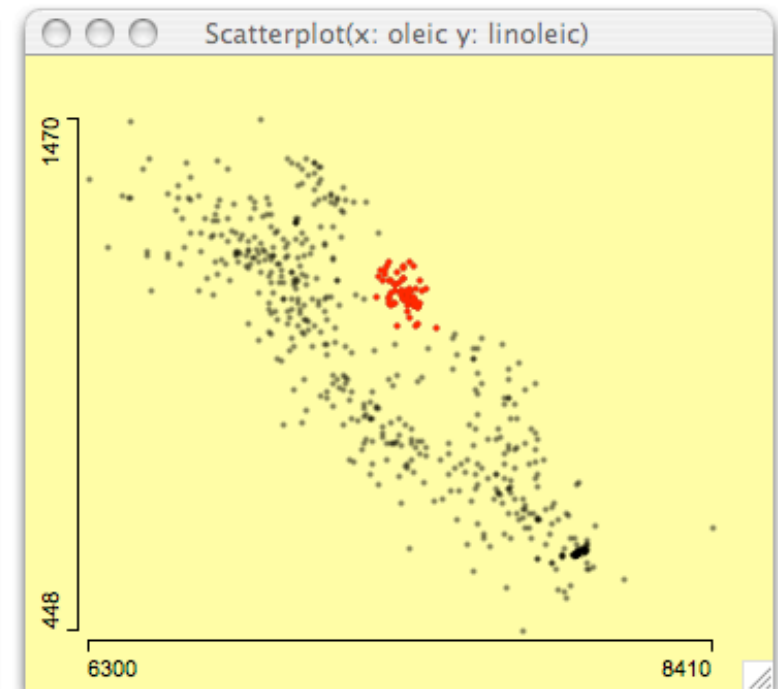
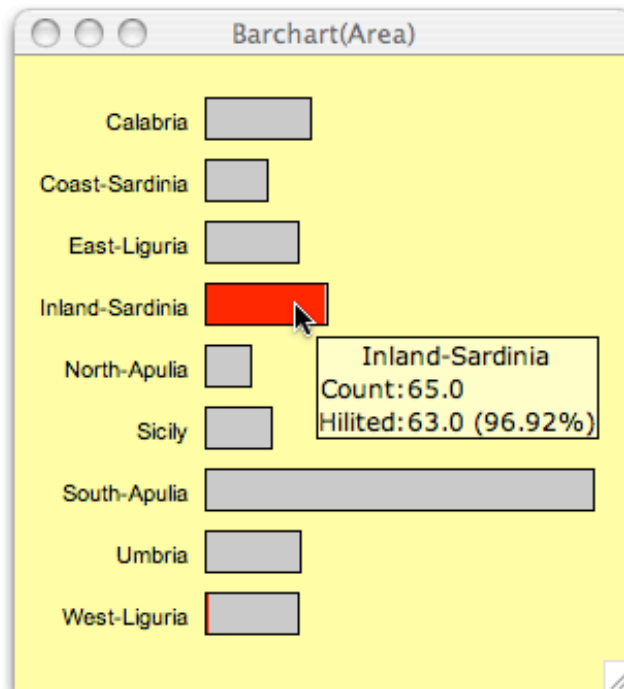


Chapter 1

Interactivity

Queries

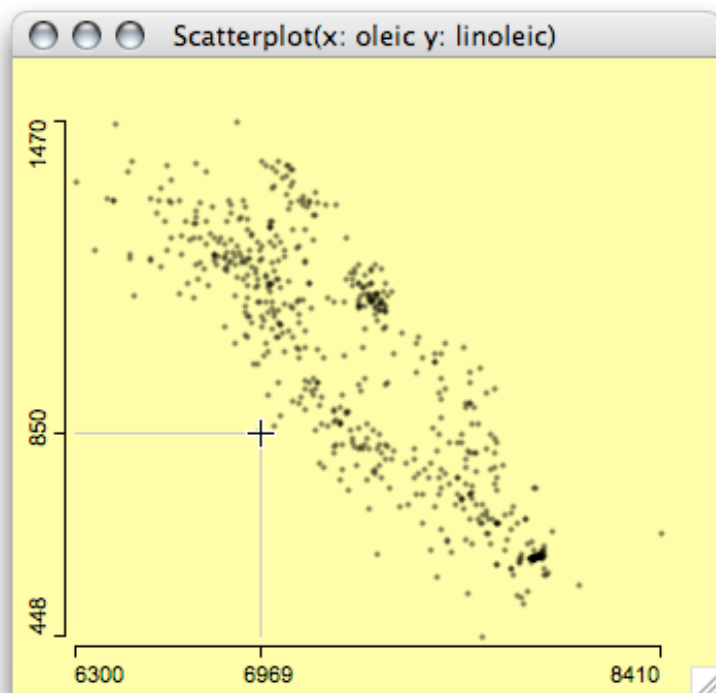
- Graphics are good at communicating qualitative information but fail to give exact quantities \Rightarrow need queries to get exact values
- Gridlines can help (only) for the variables within the plot
- Interactive graphics often display very little scale information (cf. Tufte's "data-ink-ratio")
- Examples:



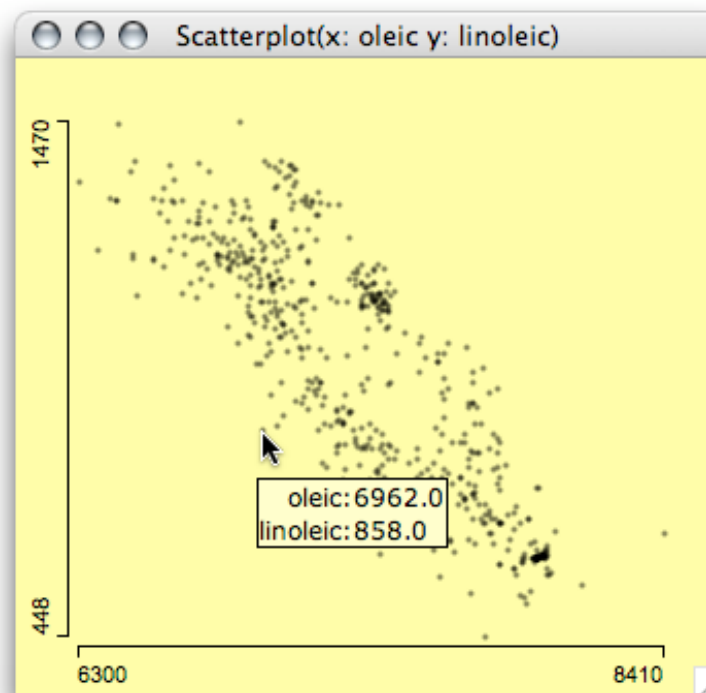
Levels of Queries

- The level of detail of a query should have optional granularities:
 - **orientation**, “what are the coordinates at the mouse pointer” (interactive grid)
 - **standard**, “what are the coordinates of a particular value”
 - **extended**, “what are the values for an object beyond the variables in the plot”
- Example: scatterplot

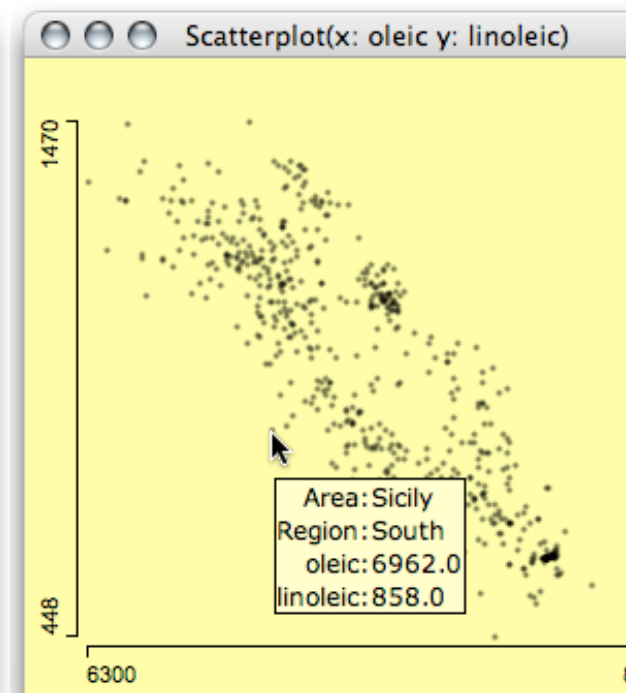
orientation



standard

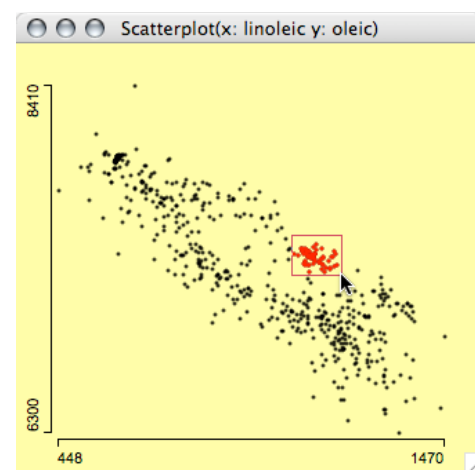
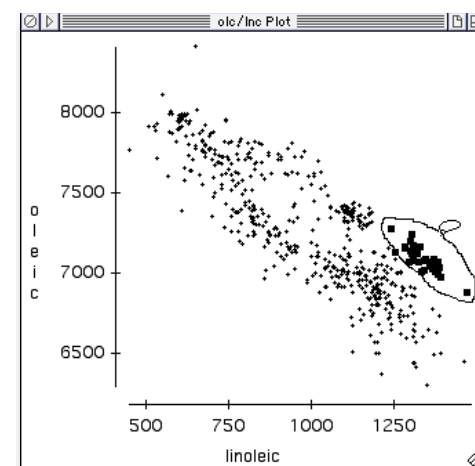


extended



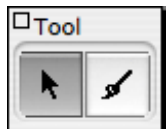
Selections

- Selections as such are not really interesting – but they are the necessary step to specify subsets of interest
- In an exploratory set-up we often want to look at the properties of specific subgroups, like
“Find all customers, who paid less than 15% tip, at night, except on weekdays!”
- The flexibility with which we can select data directly determines the how successful we may solve the exploratory analysis.
- Obviously we need different selection tools and selection modes



Selections: Tools

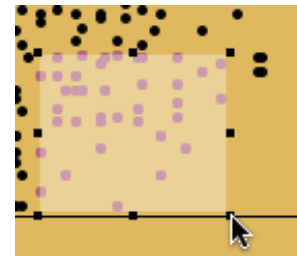
- Different Tools can be provided to select data:
 - **Pointer**
The Pointer is used to select single points.
 - **Drag-Box**
The Drag-Box selects rectangular regions in a graphics window.
 - **Brush**
Brushing allows a dynamic change (movement) of the selected region – usually a rectangle.
 - **Slicer**
The slicer selects intervals along an axis dynamically.
 - **Lasso**
The lasso allows the most flexible definition of the selection area. Startpoint and endpoint are always connected.



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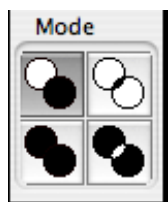
DataDesk



Mondrian

Selections: Modes

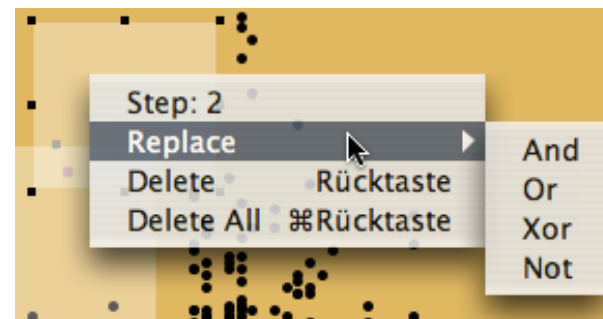
- Simple / Standard / Default
 - Only points in the selected region are selected.
- Intersection / AND / \cap
 - Only points that already were selected and are within the new selection stay selected.
- Union / OR / \cup
 - The newly selected points are added to the current selection.
- Toggle / XOR / \oplus
 - Selected points are deselected, unselected are selected.
- Negation / NOT / \neg
 - Points in the selection region are taken out of the current selection set.



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DataDesk



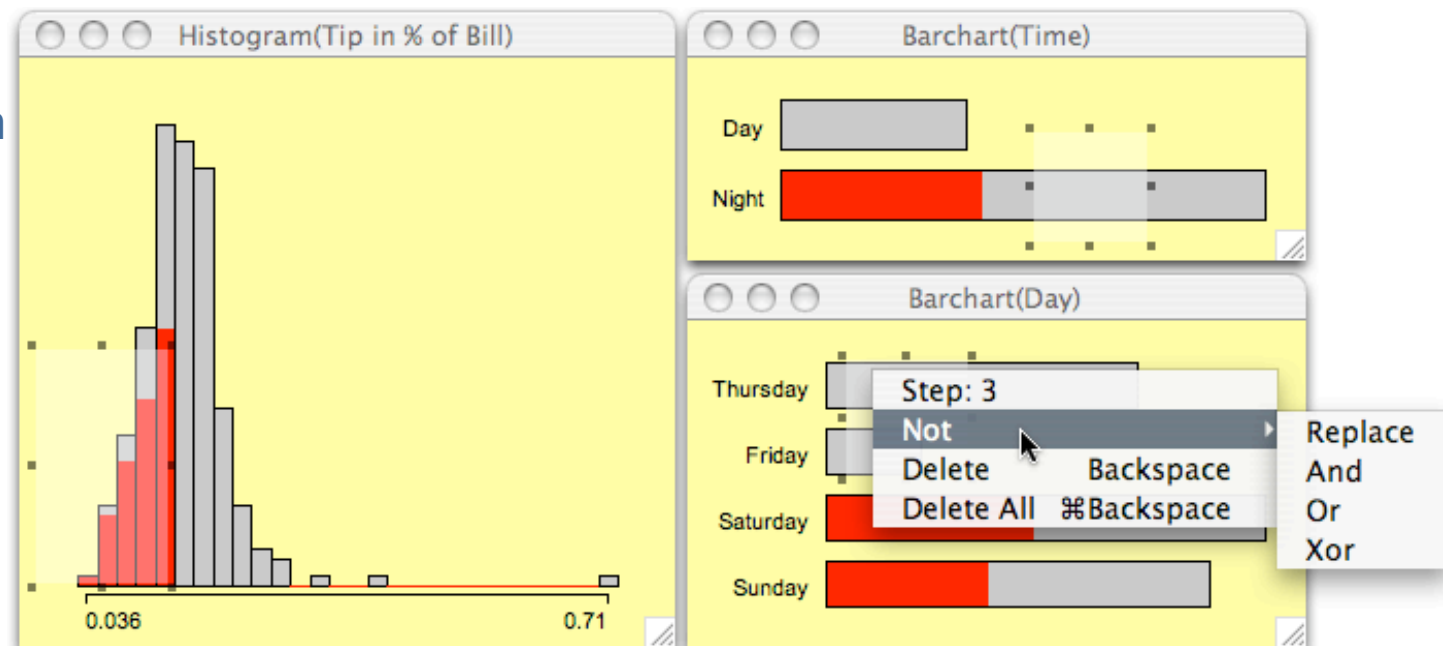
Mondrian

Selections Sequences

- Why do we need Selection-Sequences?
 - A selection usually only exists as a set of selected points
⇒ no formal description of this set
 - Setting up complex selection sets is hard
⇒ errors are fatal, i.e. can not be re-done.
 - Alteration of the selection set is usually impossible
⇒ the complete selection must be repeated

- Tech. Solution

- For each selection we store:
 - id
 - plot
 - coordinates
 - selection mode



Selections Sequences

- Selection-Sequences are directed, i.e. for any three selection sets A, B, C

$$A \text{ OR } B \text{ AND } C = A \text{ OR } (B \text{ AND } C) \neq ((A \text{ OR } B) \text{ AND } C)$$

and

$$A \cup B \cap C = A \cup (B \cap C) \neq ((A \cup B) \cap C)$$

holds, i.e. explicit left-parenthesis!

- Usually this is what the user was thinking about!
- Selection-Sequences can easily be translated into SQL. (Again, mind the left to right order of operators!)