CSE 557A | Jan 31, 2017

INFORMATION VISUALIZATION

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Slides Credit: Mariah Meyer

Today…

Data Types
Data Mapping

DATA

data types

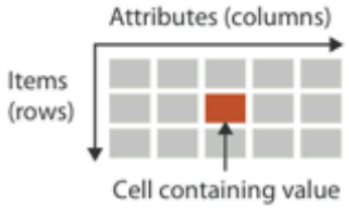
- Items
- Attributes
- Links
- Positions

dataset types

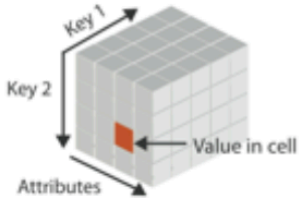
Tables

Items

Attributes



➔ *Multidimensional Table*

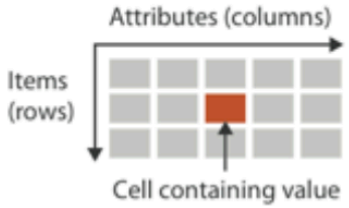


dataset types

Tables

Items

Attributes



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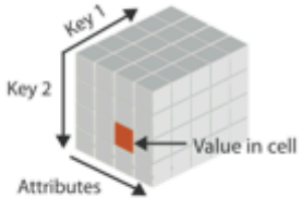


A	B	C	S	T	U
Order ID	Order Date	Order Priority	Product Container	Product Base Margin	Ship Date
3	10/14/06	5-Low	Large Box	0.8	10/21/06
6	2/21/08	4-Not Specified	Small Pack	0.55	2/22/08
32	7/16/07	2-High	Small Pack	0.79	7/17/07
32	7/16/07	2-High	Jumbo Box		7/17/07
32	7/16/07	2-High	Medium Box		7/18/07
32	7/16/07	2-High	Medium Box		7/18/07
35	10/23/07	4-Not Specified	Wrap Bag	0.52	10/24/07
35	10/23/07	4-Not Specified	Small Box	0.58	10/25/07
36	11/3/07	1-Urgent	Small Box	0.55	11/3/07
65	3/18/07	1-Urgent	Small Pack	0.49	3/19/07
66	[illegible]	5-Low	Wrap Bag	0.56	1/20/05
69	[illegible]	4-Not Specified	Small Pack	0.44	6/6/05
69	[illegible]	4-Not Specified	Wrap Bag	0.6	6/6/05
70	12/18/06	5-Low	Small Box	0.59	12/23/06
70	12/18/06	5-Low	Wrap Bag	0.82	12/23/06
96	4/17/05	2-High	Small Box	0.55	4/19/05
97	1/29/06	3-Medium	Small Box	0.38	1/30/06
129	11/19/08	5-Low	Small Box	0.37	11/28/08
130	5/8/08	2-High	Small Box	0.37	5/9/08

attribute

cell

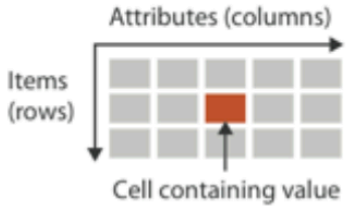
item

dataset types

Tables

Items

Attributes



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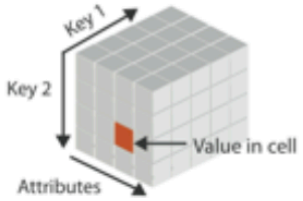
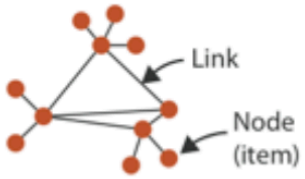


Networks & Trees

Items (nodes)

Links

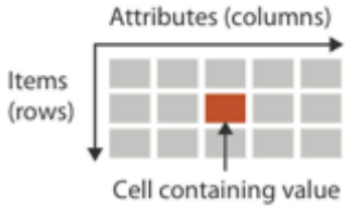
Attributes

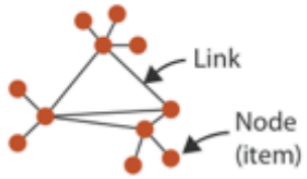


→ *Trees*

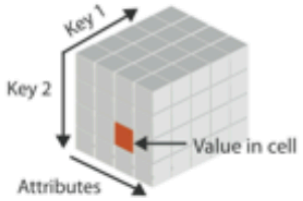
dataset types

Tables	Networks & Trees	Geometry
Items	Items (nodes)	Items
Attributes	Links	Positions
	Attributes	





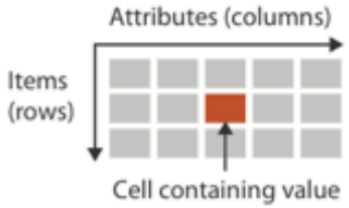
→ *Multidimensional Table*

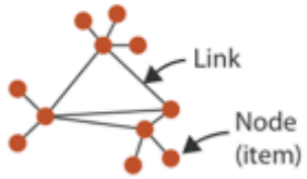


→ *Trees*

dataset types

Tables	Networks & Trees	Geometry	Clusters, Sets, Lists
Items	Items (nodes)	Items	Items
Attributes	Links	Positions	
	Attributes		





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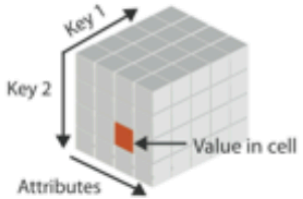
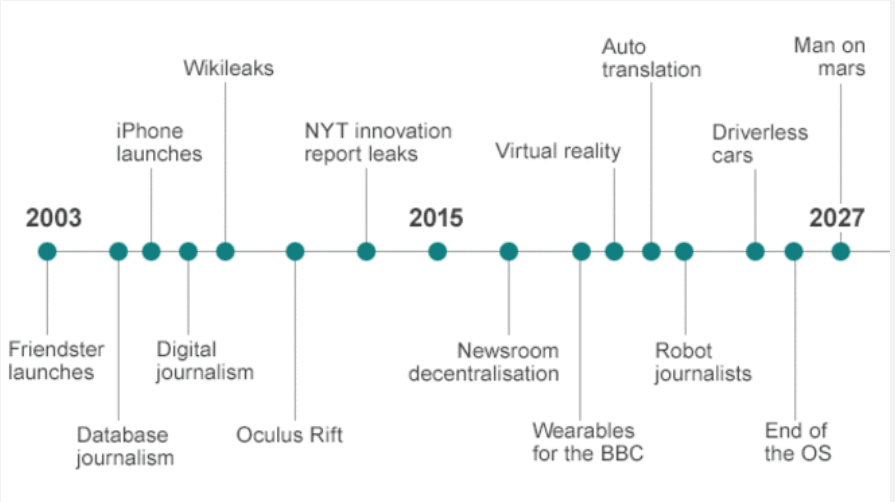


→ *Trees*

IS THIS COMPLETE?

TIMELINES?

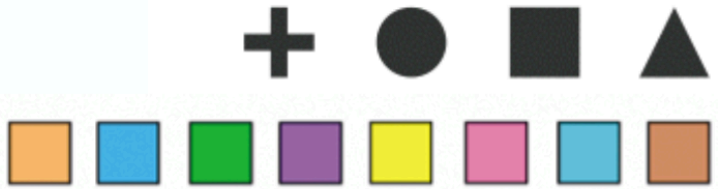
time lines are widely used and vital enough for medical records, project management, or historical presentations to create a data type that is separate from 1-dimensional data.



DATA ATTRIBUTES

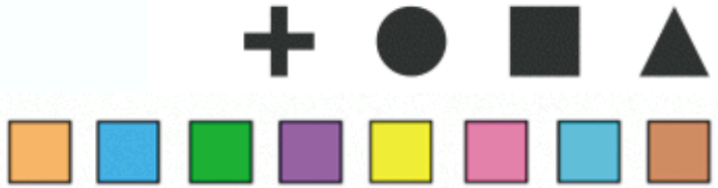
attribute types

➔ Categorical
no implicit ordering



attribute types

➔ Categorical
no implicit ordering



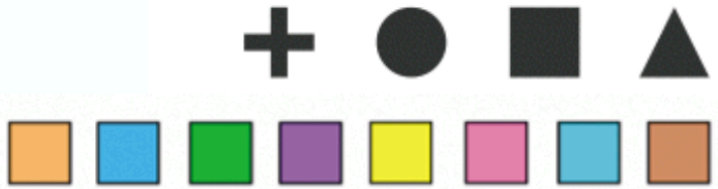
➔ Ordered

➔ *Ordinal*

Slide courtesy of Mariah Meyer

attribute types

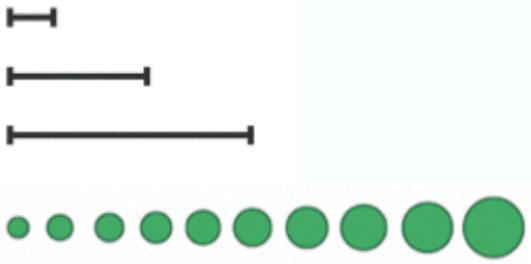
➔ Categorical
no implicit ordering



➔ Ordered

➔ *Ordinal*

➔ *Quantitative*
meaningful magnitude,
can do arithmetic



Slide courtesy of Mariah Meyer

BASIC DATA ATTRIBUTES (FORMAL)

- Nominal (N) {…}
- Ordinal (O) <…>
- Scale / Quantitative (Q) […]

- Q → O
  - [0, 100] → <F, D, C, B, A>
- O → N
  - <F, D, C, B, A> → {C, B, F, D, A}
- N → O (??)
  - {John, Mike, Bob} → <Bob, John, Mike>
  - {red, green, blue} → <blue, green, red>??
- O → Q (??)
  - Hashing?
  - Bob + John = ??

Readings in Information Visualization: Using Vision To Think. Card, Mackinglay, Schneiderman, 199

OPERATIONS ON BASIC DATA ATTRIBUTES

- What are the operations that we can perform on these data types?
  - Nominal (N)
    - = and ≠
  - Ordinal (O)
    - >, <, ≥, ≤
  - Scale / Quantitative (Q)
    - everything else (+, -, *, /, etc.)

QUESTIONS?

Visual Attributes

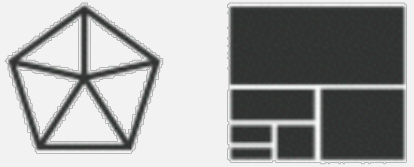
MARKS

-graphical element in an image

-classified according to number of spatial dimensions required

points (0D)

lines (1D)



areas (2D)

CHANNELS

-parameters that control the appearance of marks

- **Position**
  - Horizontal
  - Vertical
  - Both

- **Color**

- **Shape**

- **Tilt**

- **Size**
  - Length
  - Area
  - Volume

IN CLASS EXERCISE…

IN CLASS EXERCISE

- 5 groups
- Each group is assigned a visual channel:
  - shape, color, length, area, position
- Represent the following dataset using **only** your visual channel

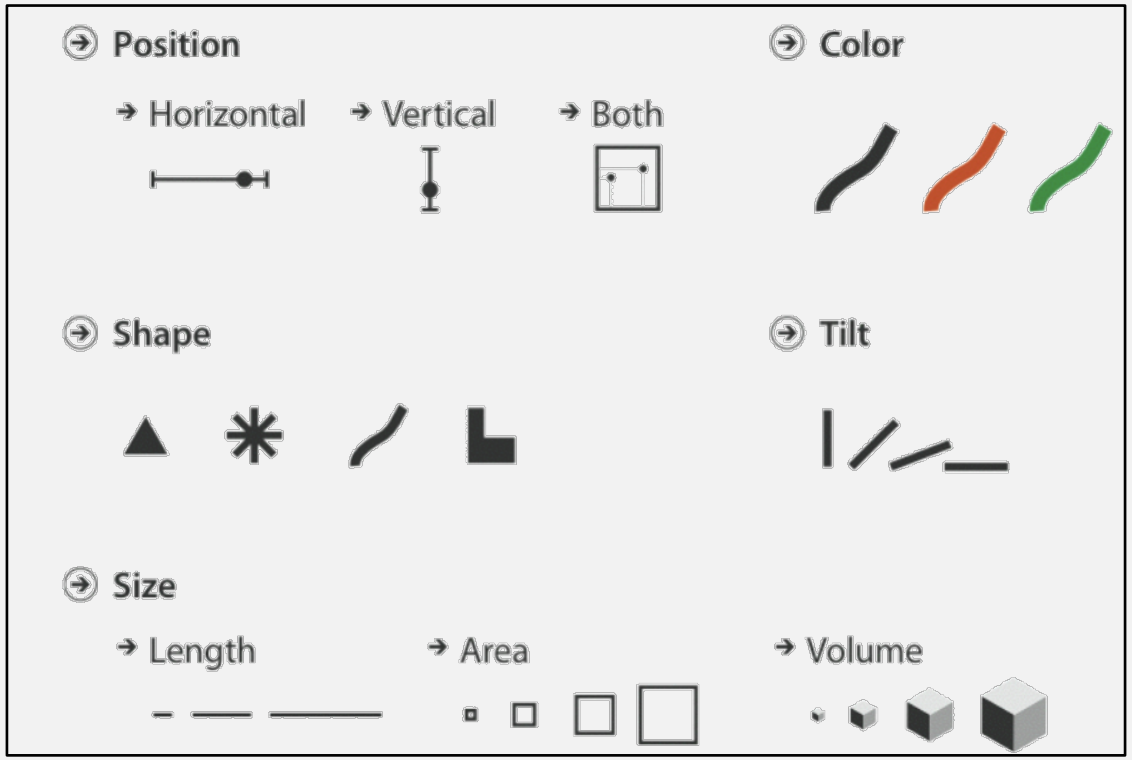
Animal	Times bitten
Cat	2
Dog	12
Bird	6

Animal	Color
Cat	brown
Dog	brown
Bird	blue

Animal	Level training
Cat	high
Dog	poor
Bird	fair

IN CLASS EXERCISE

- 5 groups
- Each group is assigned a visual channel:
  - shape, color, length, area
- Represent the following dataset using **only** your visual channel



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ANY QUESTIONS?

NEXT TIME: BARS VS PIES