

# data basics

- ▶ observations, variables, and data matrices
- ▶ types of variables
- ▶ relationships between variables

# data matrix

country	cr_req	cr_comply	ud_req	ud_comply	...	hemisphere	hdi
Argentina	21	100	134	32	...	southern	very high
Australia	10	40	361	73	...	southern	very high
Belgium	<10	100	90	67	...	northern	very high
Brazil	224	67	703	82	...	southern	high
...	...	...	...	...	...	...	...
United States	92	63	5950	93	...	northern	very high

→ observation  
(case)

↓  
variable



# types of variables

all variables

```
graph TD; A[all variables] --> B[numerical<br/>(quantitative)]; A --> C[categorical<br/>(qualitative)];
```

numerical

(quantitative)

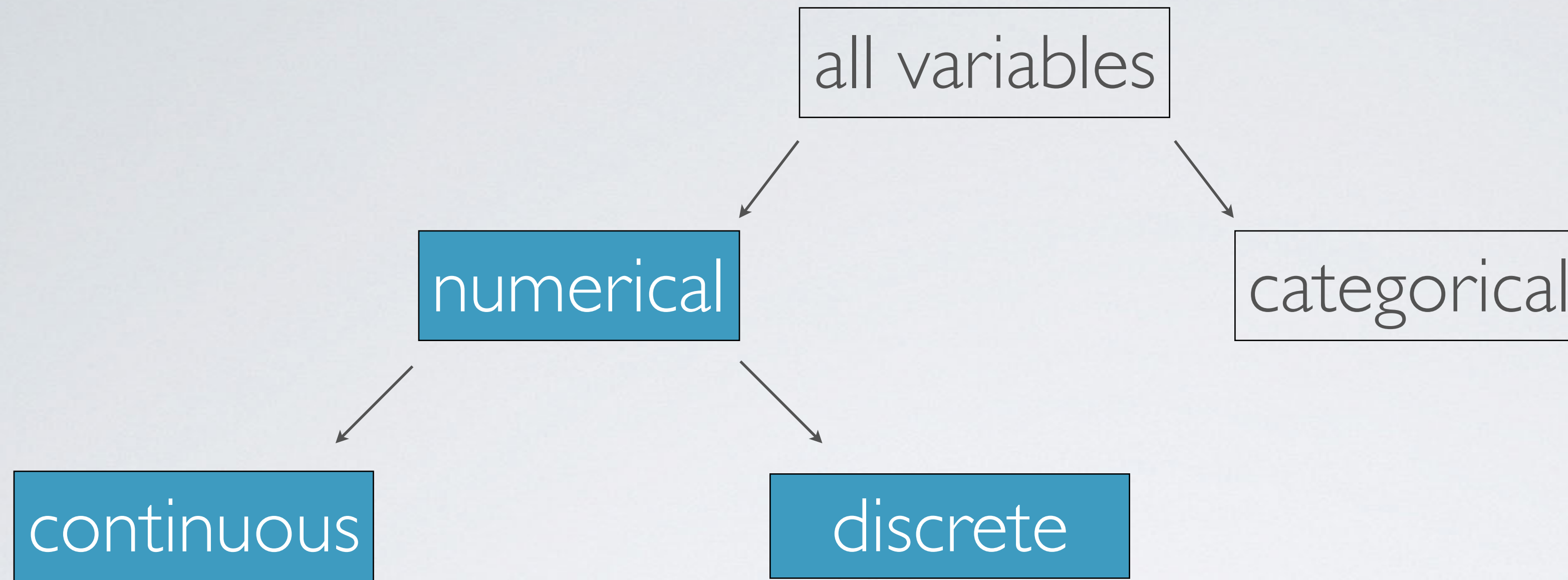
take on numerical values  
sensible to add, subtract,  
take averages, etc. with  
these values

categorical

(qualitative)

take on a limited number  
of distinct categories  
categories can be  
identified with numbers,  
but not sensible to do  
arithmetic operations

# numerical variables

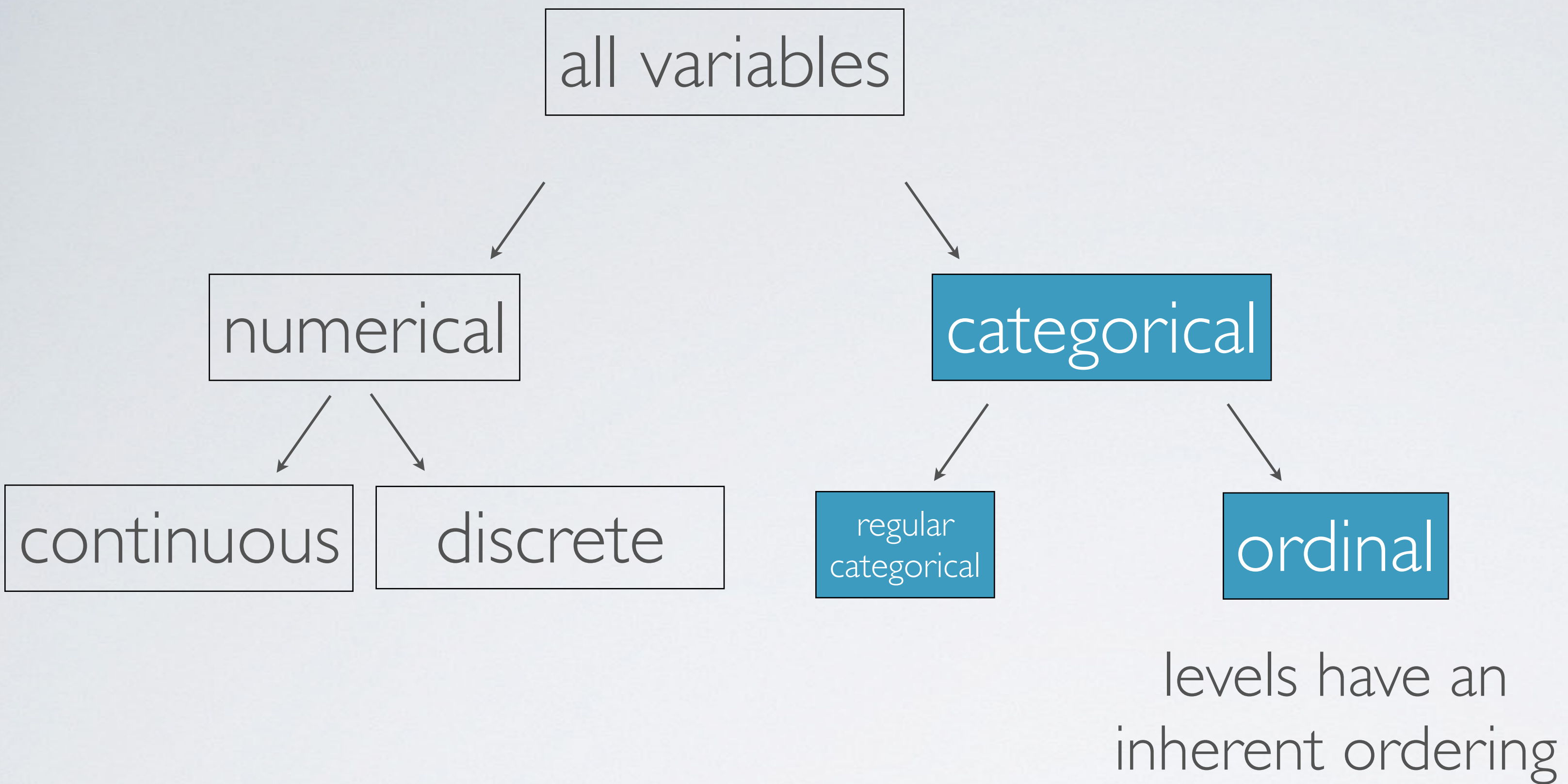


take on any of an infinite number of values within a given range

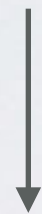
take on one of a specific set of numeric values



# categorical variables



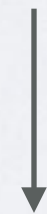
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...	...	...	...	...	...	...	...
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**country:** Name of the country



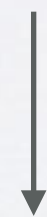
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**cr\_req**: Number of content removal requests made to Google

**discrete  
numerical**

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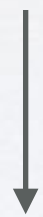


**cr\_comply**: Percentage of content removal requests Google complied with

**continuous  
numerical**

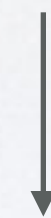


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...	...	...	...	...	...	...	...
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**ud\_req**: Number of user data requests as part of a criminal investigation

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...	...	...	...	...	...	...	...
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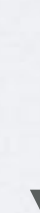


**ud\_comply**: Percentage of user data requests Google complied with

**continuous  
numerical**



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...	...	...	...	...	...	...	...
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**categorical**

**hemisphere:** Hemisphere that the country is located in  
(southern, northern)

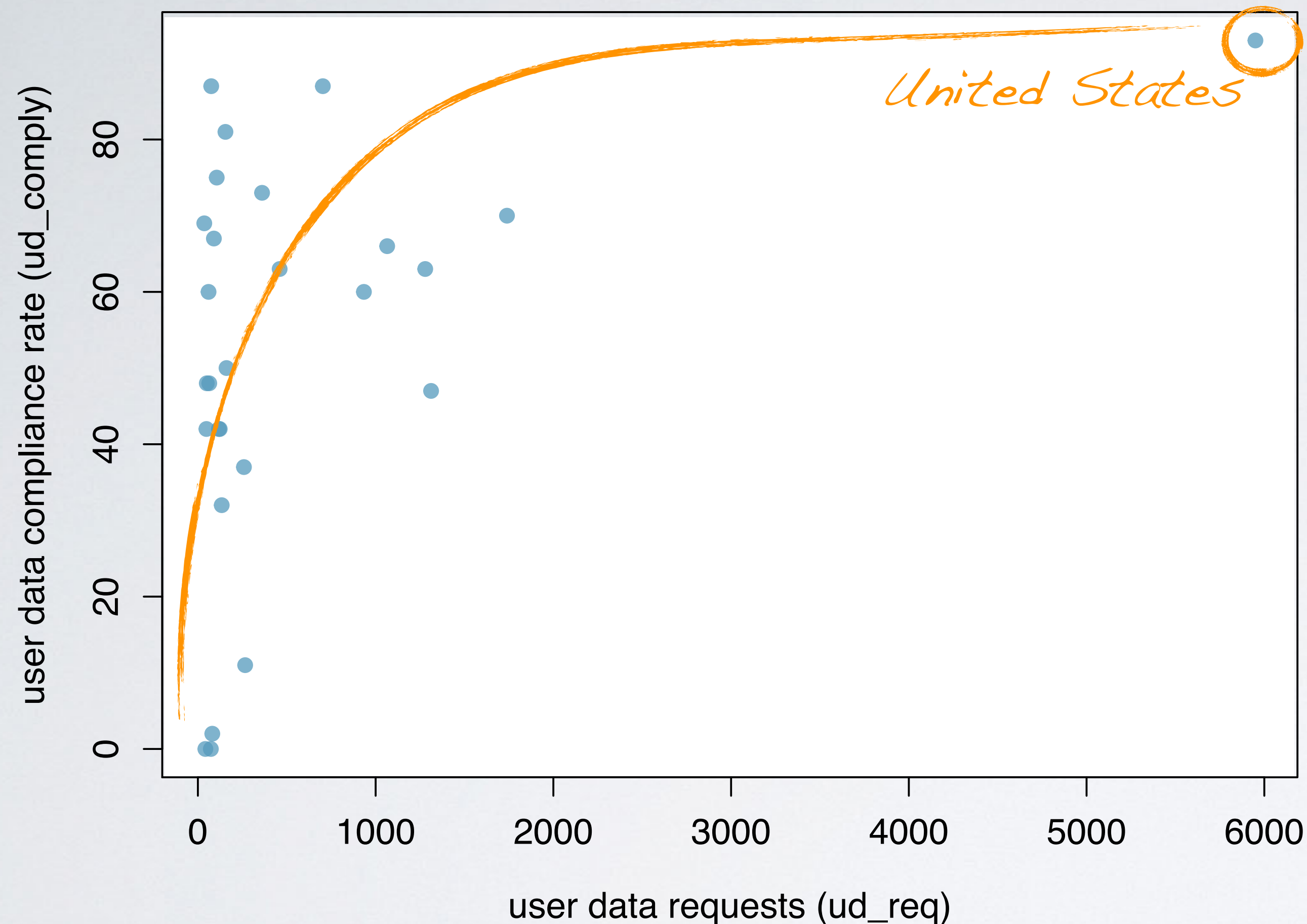
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...	...	...	...	...	...	...	...
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**hdi**: Human Development Index  
(very high, high, medium, low)



# relationships between variables



- ▶ Two variables that show some connection with one another are called **associated (dependent)**
- ▶ Association can be further described as **positive** or **negative**
- ▶ If two variables are not associated, they are said to be **independent**