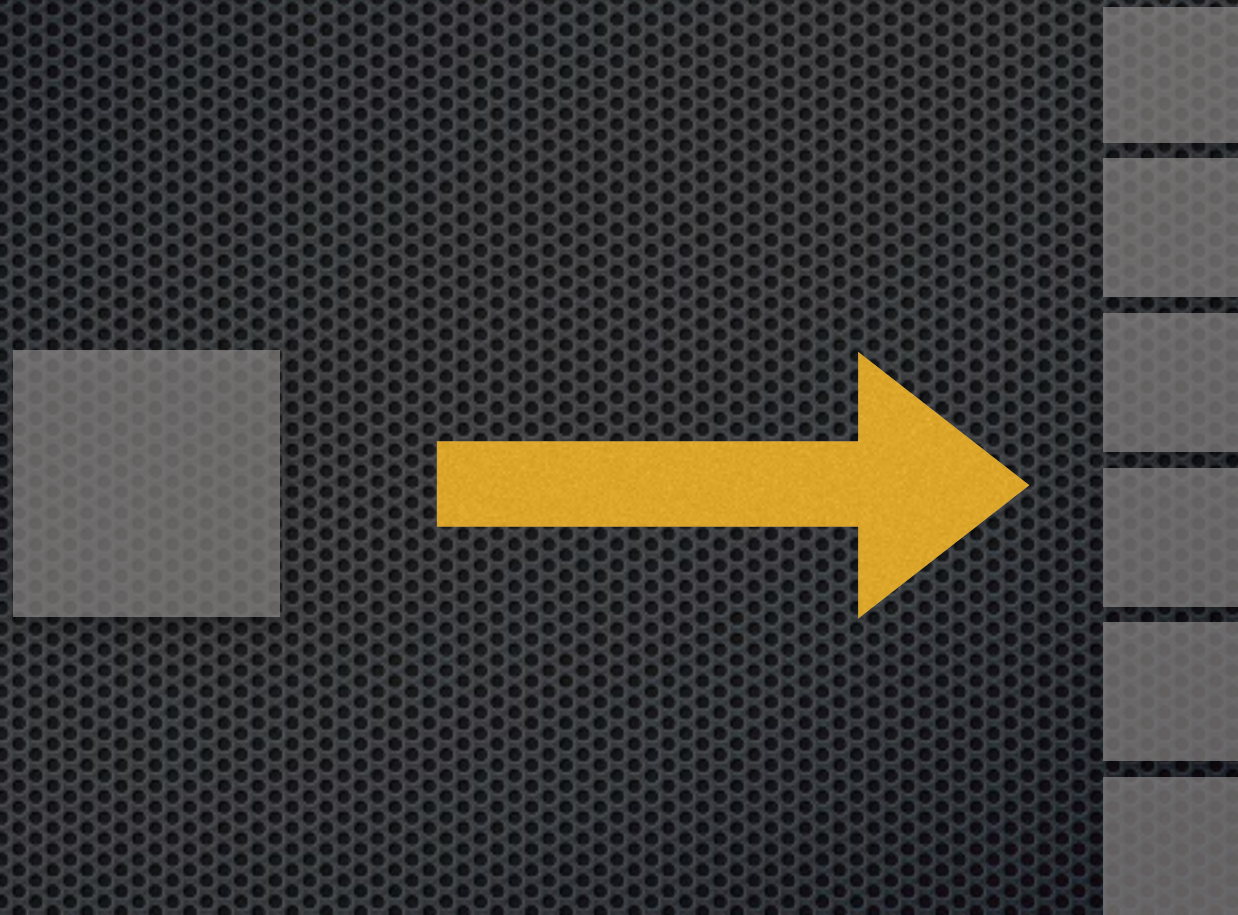


A line drawing of various cocktail glasses and a tray. In the upper left, a martini glass with a lemon twist is shown. Next to it is a tall, narrow glass with a drink and a lemon slice. Below these are two more glasses, one with a drink and a lemon slice, and another with a drink and a lemon slice. In the foreground, a tray holds a glass with a drink and a lemon slice, and another glass with a drink and a lemon slice.

Recommendations for cocktail recipes

Goal

recommendation by example



Leading question

Application: Recommendation for cocktails in bar

Have a distance function a sufficient precision for recommendation?

threshold for sufficient precision

recommendation is according to expert knowledge

Sources



[FPSS96]

KDD

preprocessing

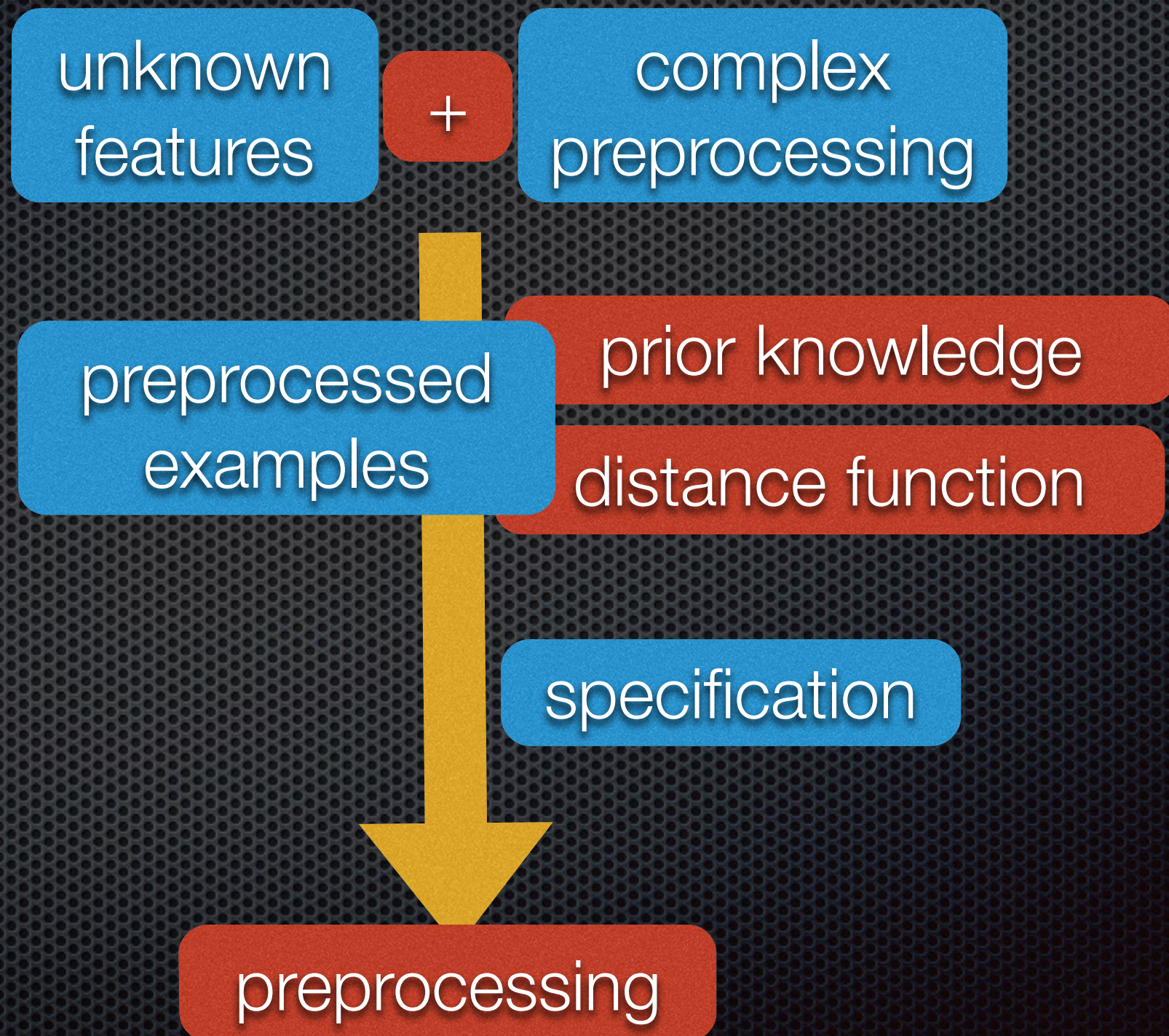
feature
extraction

clustering

recommendation



Text Mining methods



Preprocessed examples

```
<cocktail>
<title>Negroni</title>
<ingredients>
  <ingredient><quantity><value>3</value><unit>cl</unit></quantity><name>süßer Wermu
  <ingredient><quantity><value>3</value><unit>cl</unit></quantity><name>Gin</name><
  <ingredient><quantity><value>3</value><unit>cl</unit></quantity><name>Campari</na
  <ingredient><quantity><value>1</value><unit></unit></quantity><name>Orangenzeste<
</ingredients>
<preperation>stir</preperation>
<glass>cocktail glass</glass>
</cocktail>
```

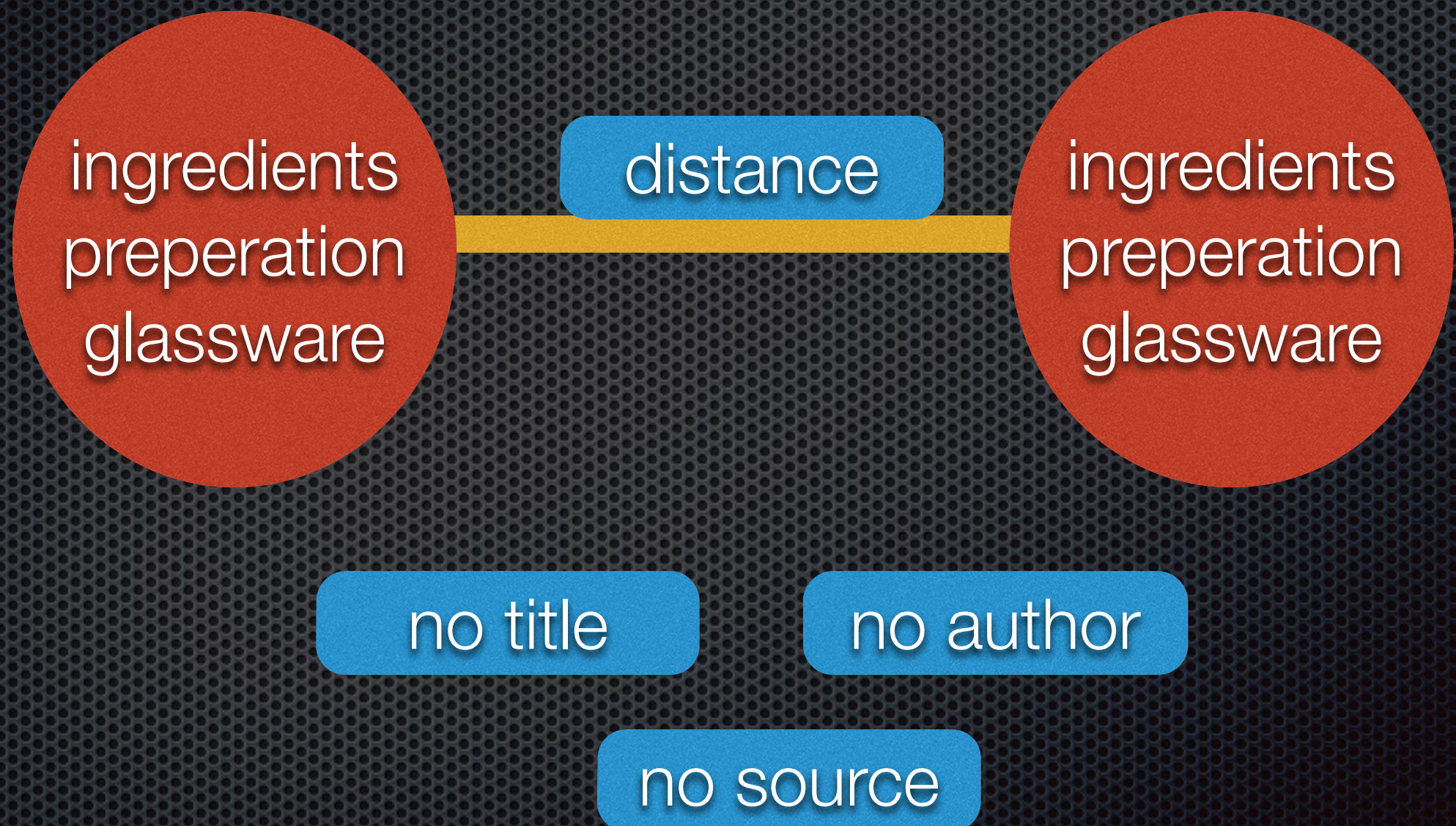
same idea

adaptions

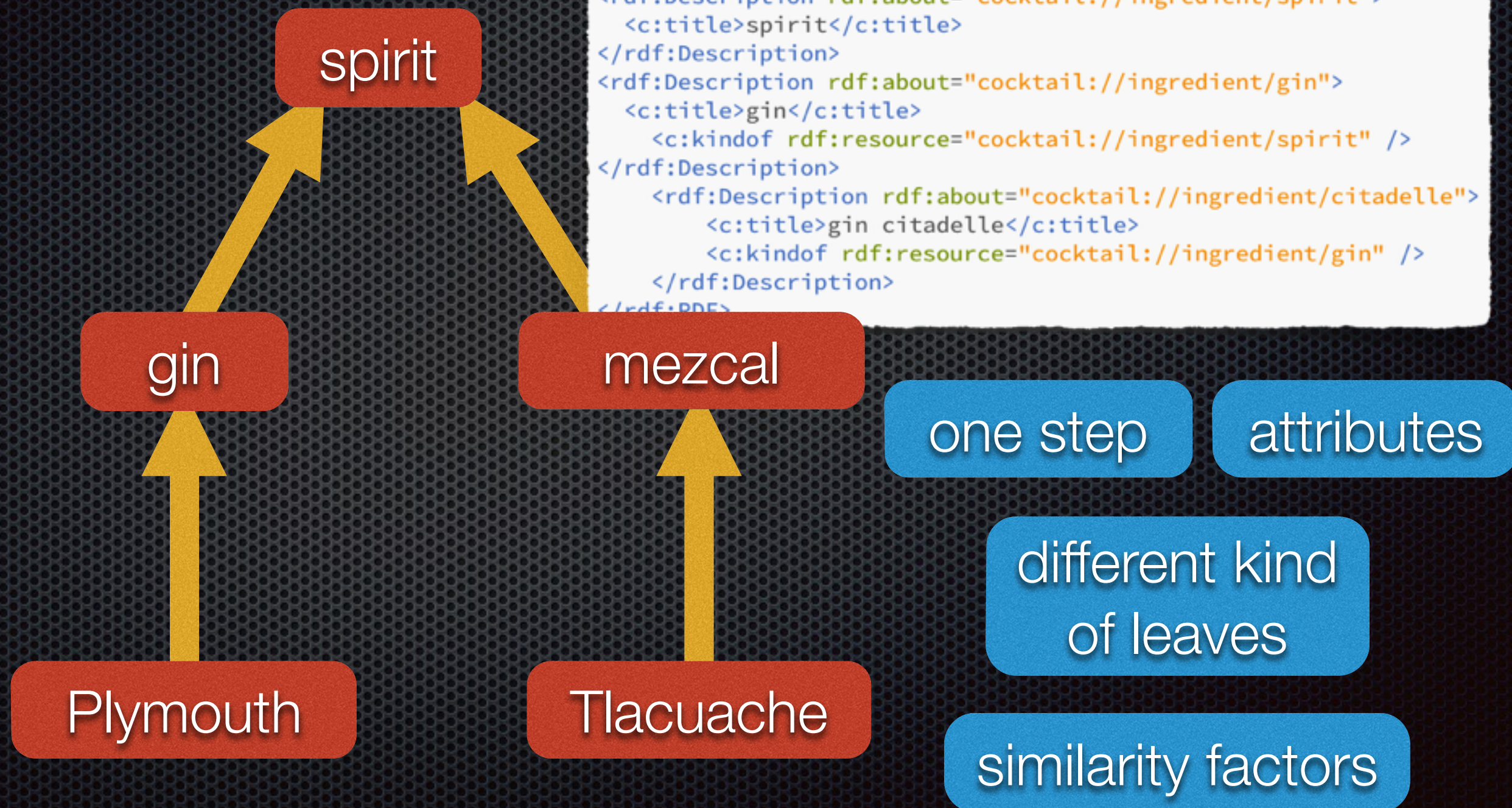
absolutely different

classics

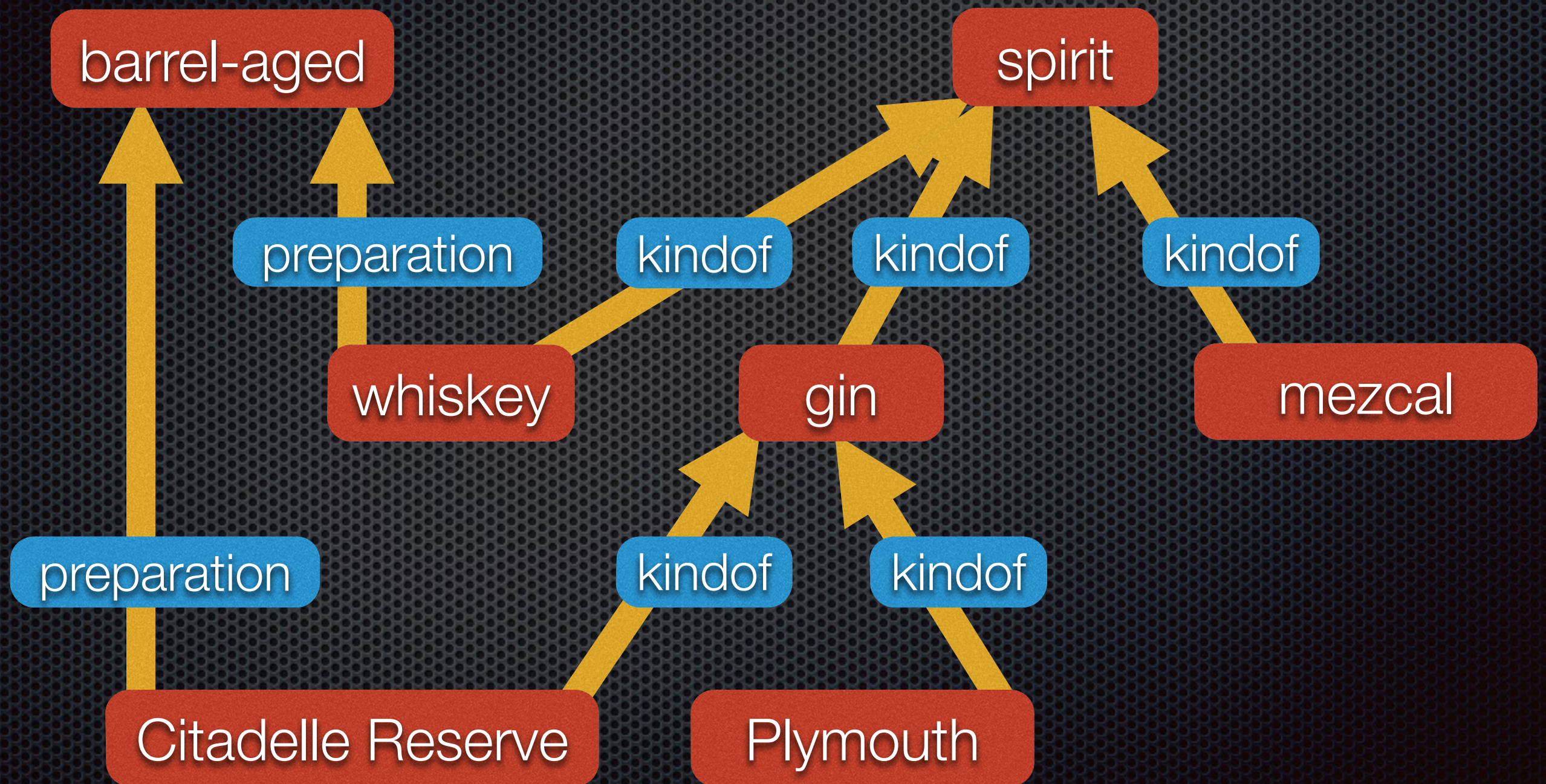
Distance function



Extraction with background knowledge



Different kind of properties



Example: Negroni

3 cl sweet Vermouth
3 cl Gin
3 cl Campari
1 orange twist

same idea

3 cl Punt e Mes
3 cl Plymouth
3 cl Campari
1 orange twist

?

3.5 cl Carpano Antica Formula
3.5 cl Tlacuache silver Leyenda
2 cl Gran Classico

adaption

Distance function precision



dependent on

ontology quality

feature weight

Collins

[KM10]

Manhattan

Balancing

alcohol

sweet

acid

water

Collins

5 cl Gin, (47 % alcohol, 53 % water)
3 cl lemon juice(5 % acid, 95 % water),
2 cl sugar syrup(2/3 sugar, 1/3 water), 20
cl soda(100 % water)

$$c(\text{alcohol}) = (5 * 0,47)/30 = 0,078$$

$$c(\text{sugar}) = (2 * 2/3)/30 = 0,044$$

$$c(\text{acid}) = (3 * 0,05)/30 = 0,005$$

$$c(\text{water}) = (5 * 0,53 + 2 * 0,95 + \\ 2 * 1/3 + 20)/30 = 0,841$$

$$\text{balance} = (c(\text{alcohol}), \\ c(\text{sugar}), c(\text{acid}), c(\text{water})))$$

Preprocessing

dot, new line with
upper case -> end

number, string, dot,
newline

keywords: stir,
strain, cocktail glass

```
1 dash Angostura Bitters.  
Mix.  
MANHATTAN,  
DRY  
1/2 French Vermouth.  
1/2 Rye or Bourbon Whisky.  
Stir and strain into cocktail glass.  
MANHATTAN,  
MEDIUM  
f ← useless character  
1/3 Rye or Bourbon Whisky.  
1/3 French Vermouth.  
1/3 Italian Vermouth.  
Stir and strain into cocktail glass,  
with cherry. A dash of Angostura  
can be added if desired.  
MANHATTAN,  
SWEET
```

Preprocessing challenges

independent rules

prefix and postfix

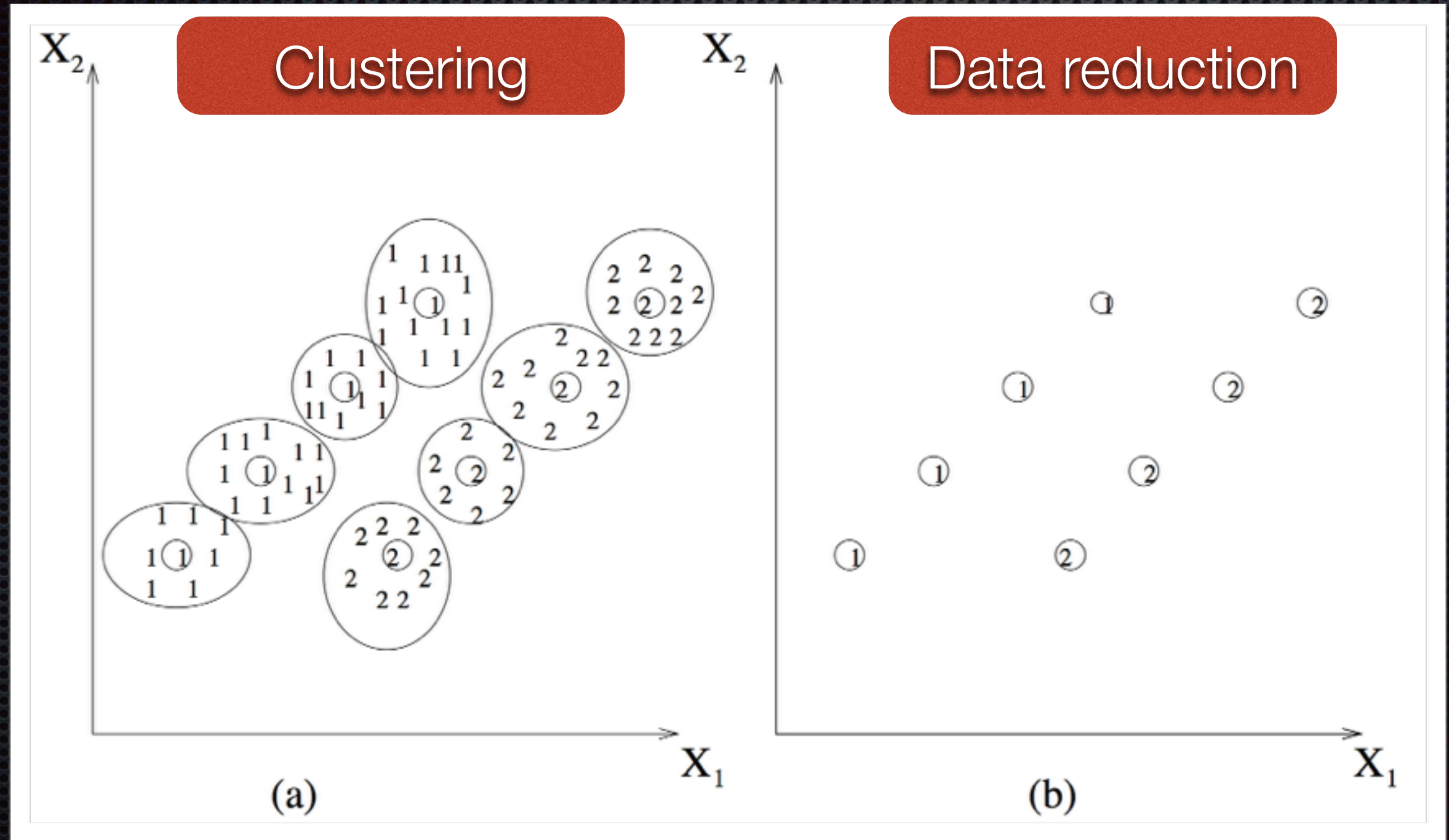
possible
character errors

semantic of numbers

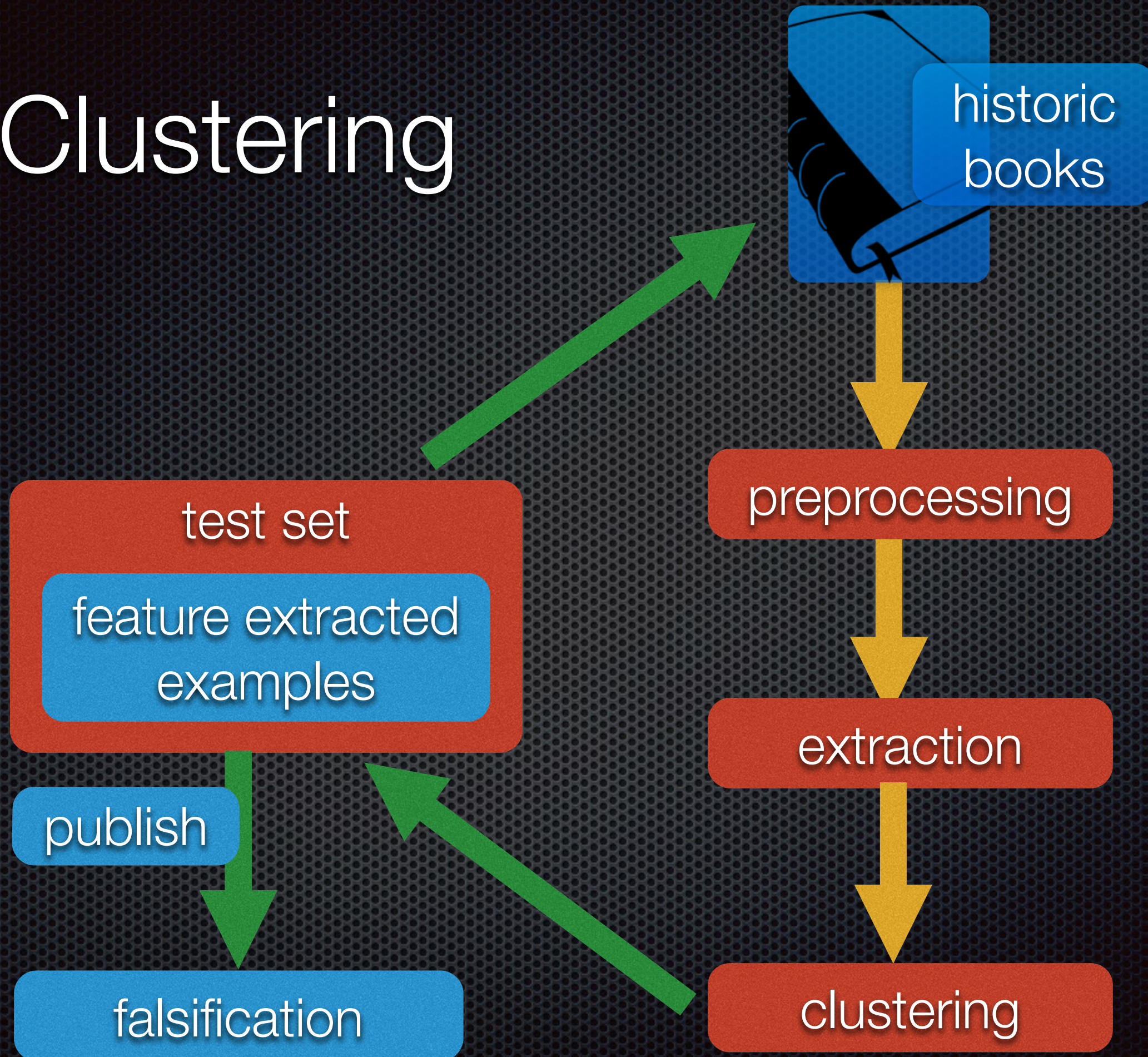
begin and end

free description text

Begin and end



Clustering



Evaluation with users

everyone

click behavior [ANH13]

implicit

satisfaction

time visit

using recommendation [OKKY14]

same opinion

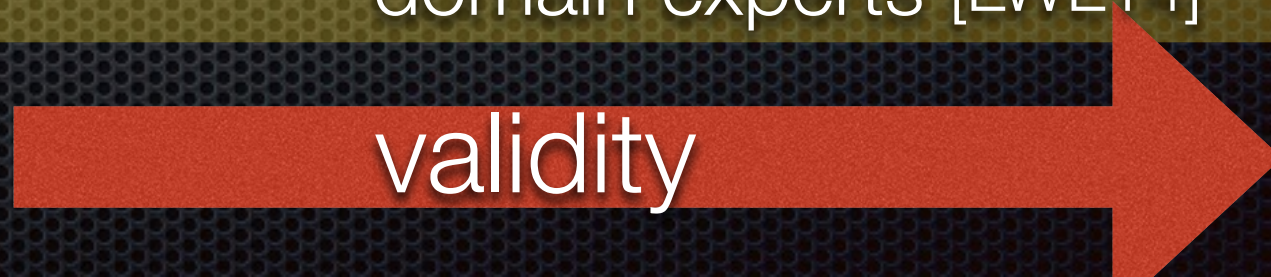
explicit

acceptance

[ZXGC14]

domain experts [LWL14]

validity



Expert requirements [McD83]



point of interest

acceptance

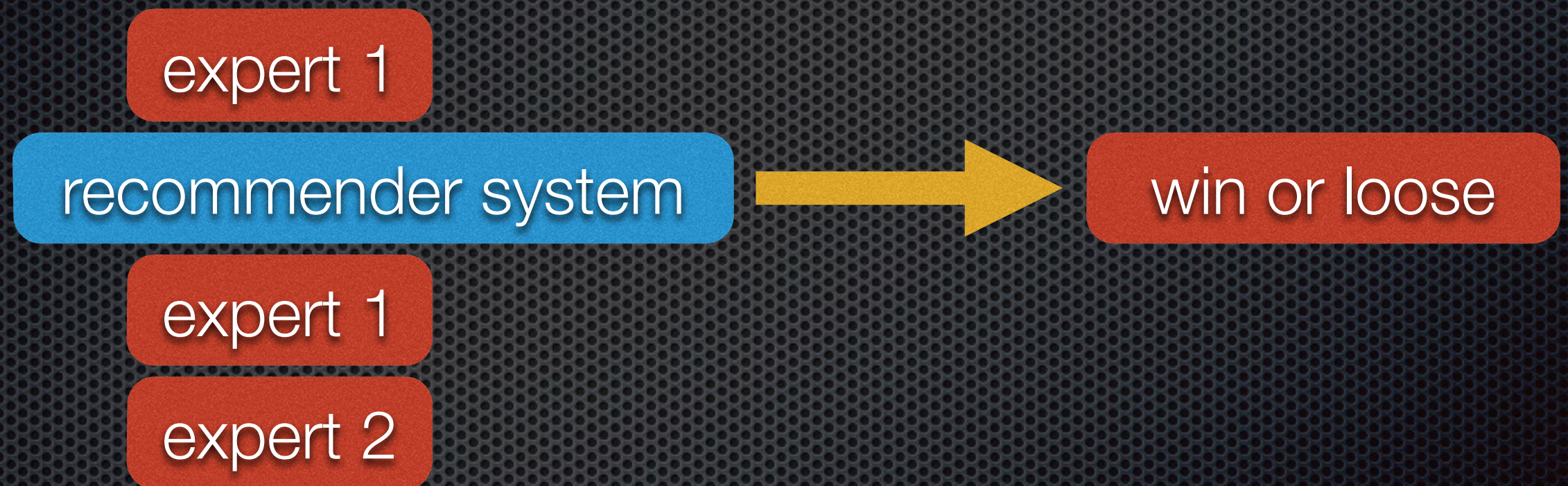
<

same opinion



king of the road

Expert knowledge evaluation



Evaluation

cocktail pairs

within a cluster

max different

nearest neighbor

check with expert knowledge

same

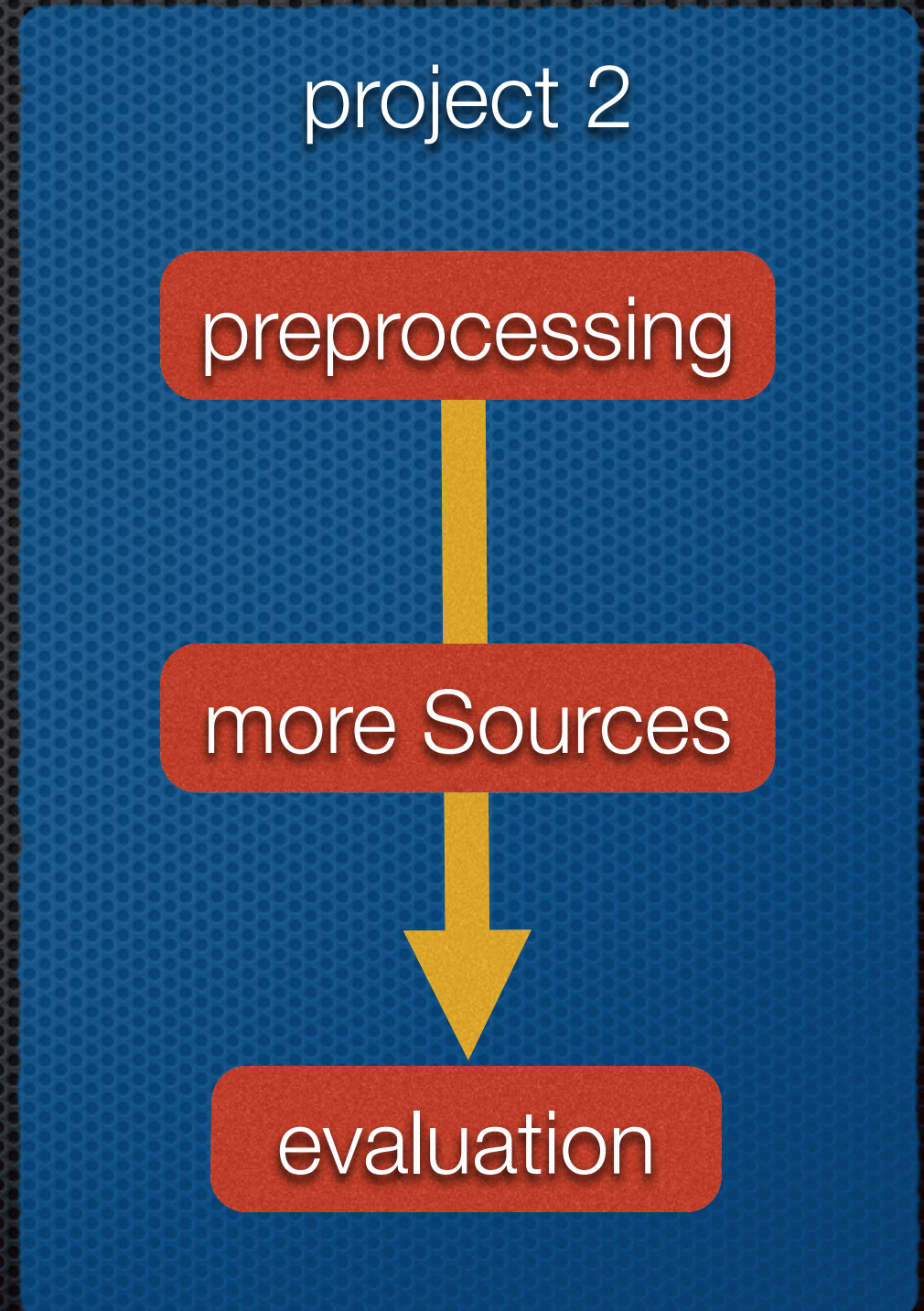
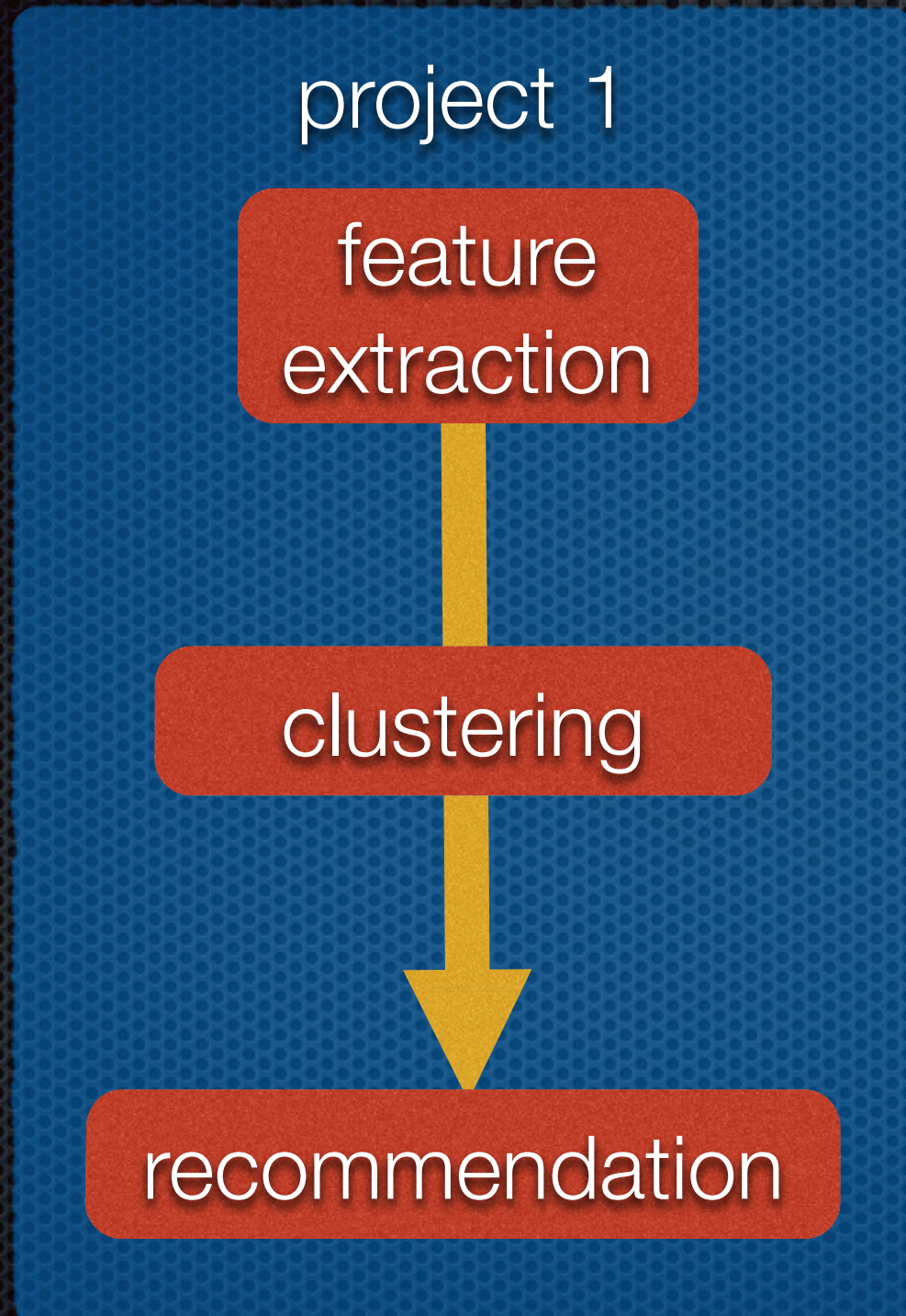
adaption

lightly similar

different



Roadmap



Sources

- [ANH13] Al-Nazer, Ahmed ; Helmy, Tarek: Semantic Query-manipulation and Personalized Retrieval of Health, Food and Nutrition Information. In: Procedia Computer Science 19 (2013), Nr. 0, 163 - 170. [http:// dx.doi.org/http://dx.doi.org/10.1016/j.procs.2013.06.026](http://dx.doi.org/http://dx.doi.org/10.1016/j.procs.2013.06.026). – DOI <http://dx.doi.org/10.1016/j.procs.2013.06.026>. – ISSN 1877–0509. – The 4th International Conference on Ambient Systems, Networks and Technologies (ANT 2013), the 3rd International Conference on Sustainable Energy Information Technology (SEIT-2013)
- [FPSS96] Fayyad, Usama ; Piatetsky-Shapiro, Gregory ; Smyth, Padhraic: The KDD Process for Extracting Useful Knowledge from Volumes of Data. In: Commun. ACM 39 (1996), November, Nr. 11, 27–34. <http://dx.doi.org/10.1145/240455.240464>. – DOI 10.1145/240455.240464. – ISSN 0001–0782
- [JMF99] Jain, A. K. ; Murty, M. N. ; Flynn, P. J.: Data Clustering: A Review. In: ACM Comput. Surv. 31 (1999), September, Nr. 3, 264–323. [http://dx. doi.org/10.1145/331499.331504](http://dx.doi.org/10.1145/331499.331504). – DOI 10.1145/331499.331504. – ISSN 0360–0300
- [KF10] Karikome, Shihono ; Fujii, Atsushi: A System for Supporting Dietary Habits: Planning Menus and Visualizing Nutritional Intake Balance. In: Proceedings of the 4th International Conference on Ubiquitous Information Management and Communication. New York, NY, USA : ACM, 2010 (ICUIMC '10). – ISBN 978–1–60558–893–3, 56:1–56:6
- [LWL14] Li, Xin ; Wang, Mengyue ; Liang, T.-P.: A multi-theoretical kernel-based approach to social network-based recommendation. In: Decision Support Systems 65 (2014), Nr. 0, 95 - 104. [http:// dx.doi.org/http://dx.doi.org/10.1016/j.dss.2014.05.006](http://dx.doi.org/http://dx.doi.org/10.1016/j.dss.2014.05.006). – DOI <http://dx.doi.org/10.1016/j.dss.2014.05.006>. – ISSN 0167–9236. – Crowdsourcing and Social Networks Analysis
- [McD83] McDermott, John: Extracting Knowledge from Expert Systems. In: Proceedings of the Eighth International Joint Conference on Artificial Intelligence - Volume 1. San Francisco, CA, USA : Morgan Kaufmann Publishers Inc., 1983 (IJCAI'83), 100–107
- [OKKY14] Oh, Jinoh ; Kim, Sungchul ; Kim, Jinha ; Yu, Hwanjo: When to recommend: A new issue on {TV} show recommendation. In: Information Sciences 280 (2014), Nr. 0, 261 - 274. [http:// dx.doi.org/http://dx.doi.org/10.1016/j.ins.2014.05.003](http://dx.doi.org/http://dx.doi.org/10.1016/j.ins.2014.05.003). – DOI <http://dx.doi.org/10.1016/j.ins.2014.05.003>. – ISSN 0020–0255
- [ZXGC14] Zhu, Hengshu ; Xiong, Hui ; Ge, Yong ; Chen, Enhong: Mobile App Recommendations with Security and Privacy Awareness. In: Proceedings of the 20th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining. New York, NY, USA : ACM, 2014 (KDD '14). – ISBN 978–1–4503–2956–9, 951–960