



**University of
Zurich^{UZH}**

Department of Geography

Integration of folksonomies into the process of map generalization

Meysam Aliakbarian and Robert Weibel

GIScience Center, Department of Geography
University of Zurich

AGILE 2016

Workshop on Generalisation and Multiple Representation

Agenda

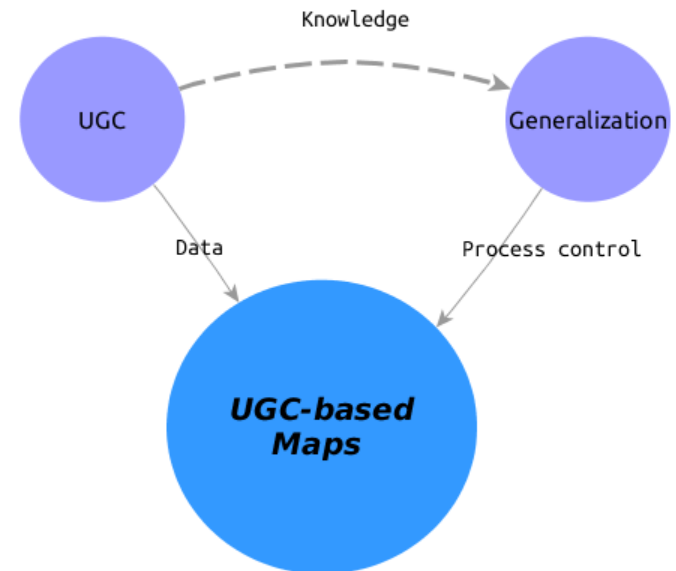
- Motivation
- Background
- Methodology
- Results
- Outlook



<http://cdn2.business2community.com/wp-content/uploads/2014/08/presentation.jpg>

Motivation

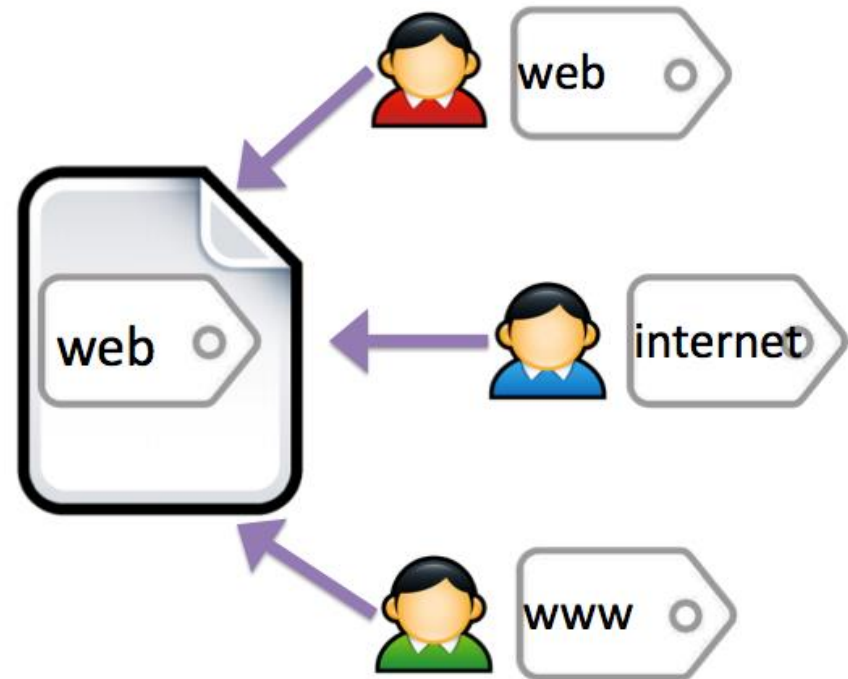
- User Generated Content (UGC) is growing in:
 - quantity
 - diversity
 - quality
- Most of UGC content have a geographic component
- Cartographic products based on UGC content need to focus more on the hidden knowledge.



Background – Pillar I

Folksonomies

- Taxonomies formed by tagging behavior of user
- Studies are on *relation (y)* between *users, resources* and *tags*:
 - $F = f(u, r, t, y)$
- First examples are based on tagging behavior of user in social bookmarking systems.



<http://www.mysmu.edu/phdis2008/meiqun.hu.2008/web/tagging-preference.png>

Background – Pillar II

OSM

- Features are stored in form of *nodes*, *ways*, *relations*
- Users enrich features with tags (key, value)
- Tagging policies are agreed upon users in OSM wiki
- Shared agreed tags can be taken as users common agreement on features
- Folksonomy:
 - features -> resource
 - tags -> tags



https://pbs.twimg.com/profile_images/1332105692/OSM_fixed_512.png

Background – Pillar III

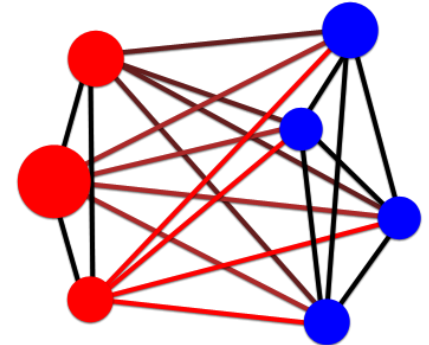
Semantic similarity

- Notion of similarity (relatedness) between concepts
- Level of commonality is being measured
- Different measures are available in the literature:

- Jaccard
$$sim_Jaccard(X,Y) = \frac{|X \cap Y|}{|X \cup Y|}$$

- Dice
$$sim_dice(X,Y) = \frac{2|X \cap Y|}{|X| + |Y|}$$

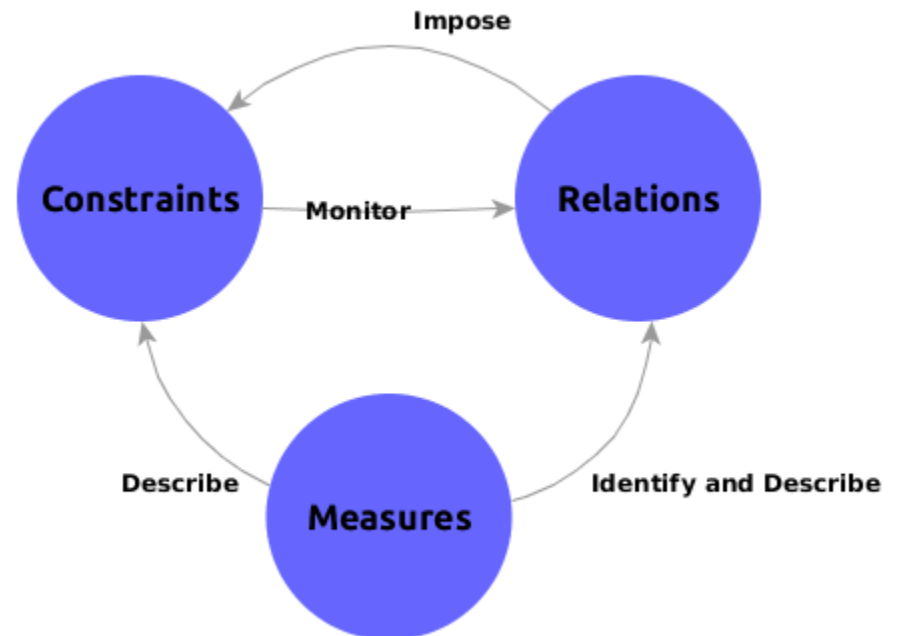
- Cosine
$$sim_cosine(X,Y) = \frac{X \cdot Y}{\|X\| \|Y\|}$$



Background – Pillar IV

Generalization

- Taking constraint-based modeling as state of the art
- Three-fold relation between *constraints*, *measures* and *relations* (Steiniger and Weibel 2007)



Methodology

Semantic similarity in Generalization

- Calculating feature-feature similarity
 - Taking a feature as a central feature
 - Calculating similarity of other features (feature-feature)
 - Including the measures into generalization operator

- Notion of similar/dissimilar

$$s = Sim(X, Y) : \begin{cases} s < \alpha \rightarrow dissimilar \\ \alpha \leq s \leq \beta \rightarrow similar \\ s > \beta \rightarrow test\ if\ X = Y \end{cases}$$

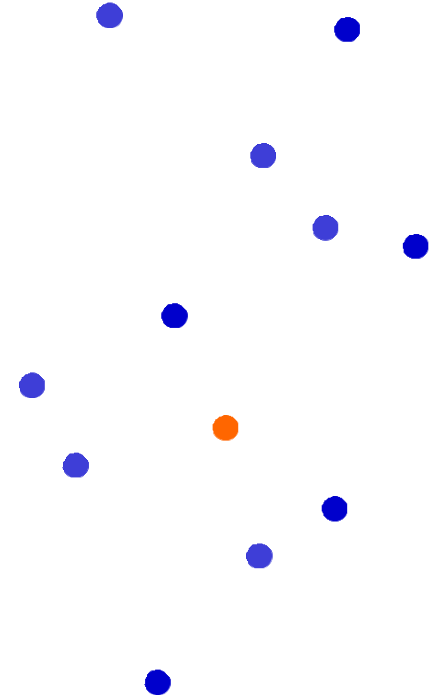
- Including values in similarity measure

$$Sim_{KeyValue}(X, Y) = \frac{\left(\frac{2|K_X \cap K_Y|}{|X| + |Y|} + \frac{|V_X \cap V_Y|}{|K_X \cap K_Y|} \right)}{2}$$

Methodology

Modification of Generalization operators

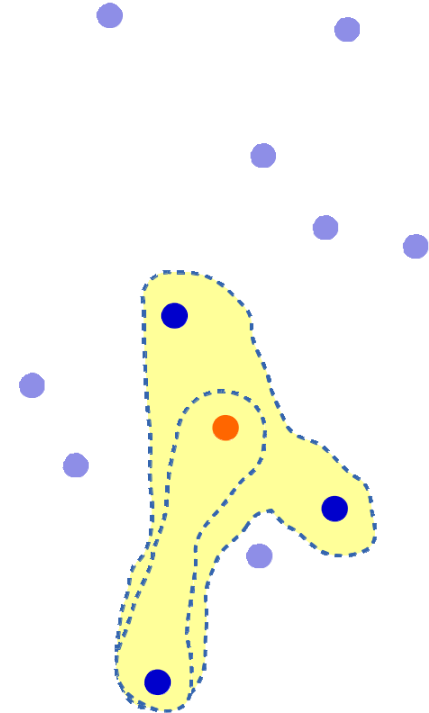
- Selection
 - Selecting semantically similar features
 - Selecting semantically dissimilar features



Methodology

Modification of Generalization operators

- Aggregation
 - Aggregating semantically similar features to a new feature
 - Spatial constraint is needed



Results

amenity restaurant
cuisine french
name Cafe Rouge
wheelchair yes

amenity restaurant
cuisine fast_food
name sandwich
opening_hours Baguette...
Mo-Th 07:30-23:00;...

amenity fast_food..
website sandwich
name carlucci Subway

Search feature:
amenity restaurant
cuisine turkish
name Hazev

amenity fast_food
cuisine asian
name Lemongr...



Scenic investigation by night

Outlook

Outlook of the study

- Working on other generalization operators
- Tag-Tag analysis
- Spatial-Semantic combination
- Property inheritance for features



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Thank you!

Meysam Aliakbarian

meysam.aliakbarian@geo.uzh.ch

Robert Weibel

robert.weibel@geo.uzh.ch



References

1. **Steiniger, S., and Weibel, R. (2007).** Relations among map objects in cartographic generalization. *Cartography and Geographic Information Science*, 34(3), 175-197.
2. **Vander Wal, T. (2005).** Folksonomy. Presented at Online Information, 2005. Accessed at <http://www.vanderwal.net/essays/051130/folksonomy.pdf> on 31 March 2016.