DEIM2017 G2-1

Predicting Influential Cross-lingual Information Cascades on Twitter

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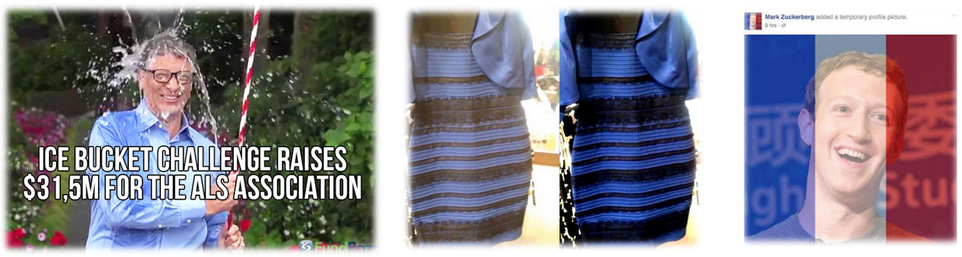
Introduction

- Information can be easily and quickly shared, and some of which can spread over different regions and languages on SNSs

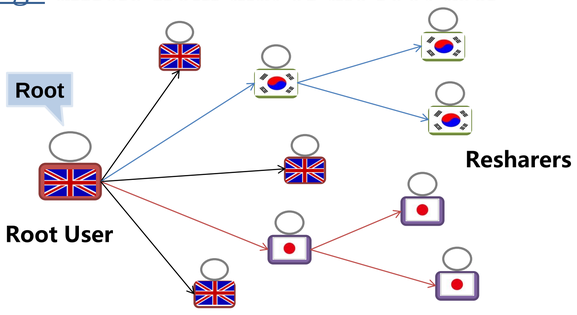


- This is the first study on cross-lingual information cascade on a large scale Twitter data (2 billion tweets and 1.5 million users)
  - ✓ Define cross-lingual information cascades
  - ✓ Observe the cross-lingual characteristics of cascades
  - ✓ Analyze the factors behind influential cross-lingual cascades
  - ✓ Build a feature-based model to detect them in an early stage
- Applications: Breaking world news tracking; global marketing

Analysis of Cascades

Definition of Information Cascades:

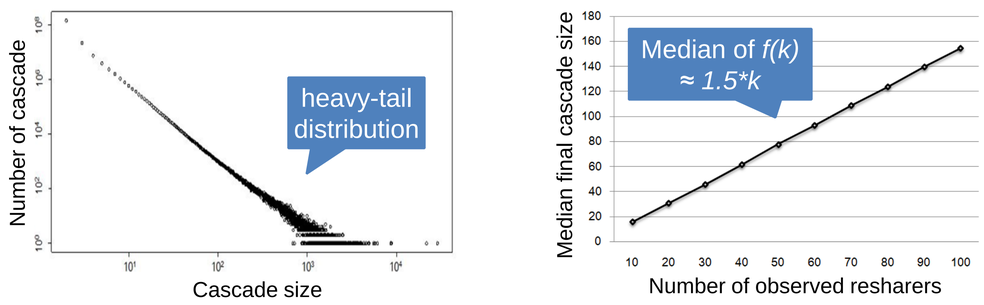
1. **Information cascade:** A set of all subsequent reshares (retweets/mentions) starting from the root node that originally create the content
2. **Cross-lingual information cascades:** A cascade contains a resharer whose main language differs from that of the root user



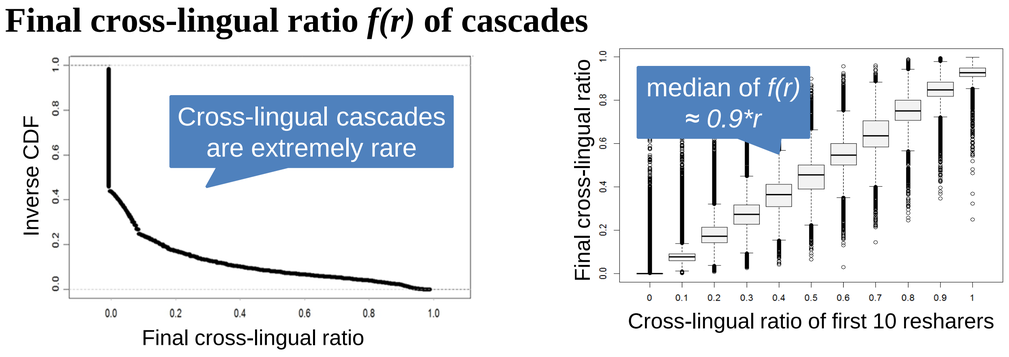
3. **Cascade size (*k*):** number of reshares
4. **Cross-lingual ratio (*r*):** proportion of cross-lingual resharers in a cascade

Properties of Information Cascades:

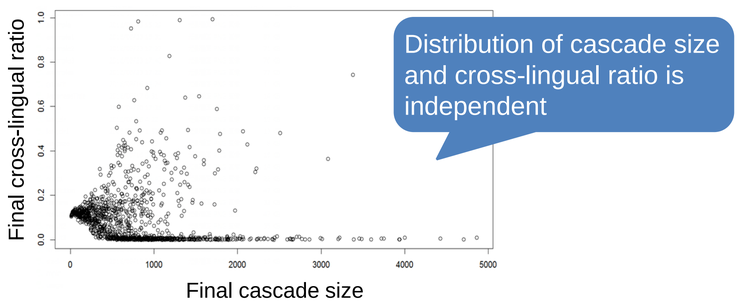
1. **Final cascade size *f(k)* of cascades** (cascades from 6/1 to 7/5, 2014)



2. **Final cross-lingual ratio *f(r)* of cascades**



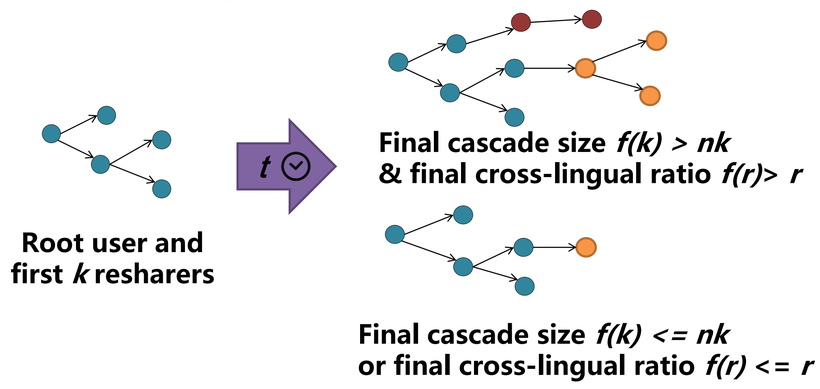
3. **Relation between cascade size and cross-lingual ratio**



Predicting Cascades

Problem Formulization:

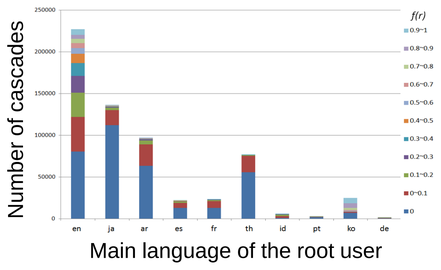
- **Influential Cross-lingual Cascade Prediction: a classification task**



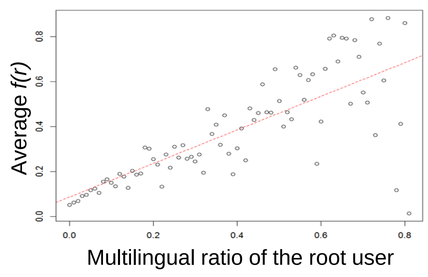
Proposed approach: feature-based approach

1. **Language features**

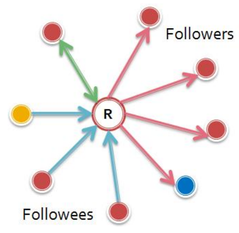
*** Main language of the users**

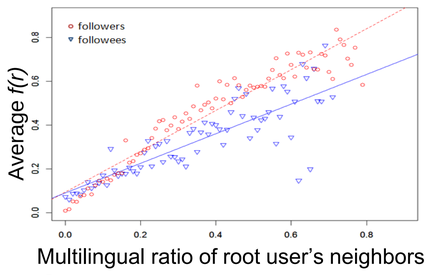


*** Usage rate of main language**

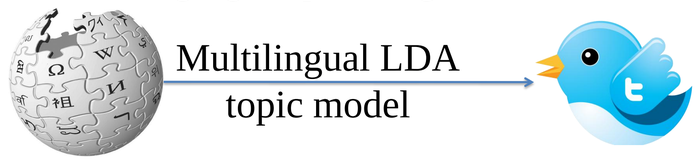


*** Multilingual neighbors (followers/followees) of the users**





2. **Content features:** language; topics; length etc.



3. **User features:** is_verified; #followers; #followees; #friends; #tweets etc.
4. **Resharer features:** ave(#followers); max(#followers) etc.
5. **Structural features:** in-degree; out-degree; graph depth etc.
6. **Temporal features:** time intervals etc.

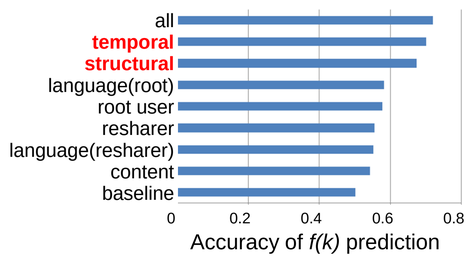
Evaluation: Linear-SVM

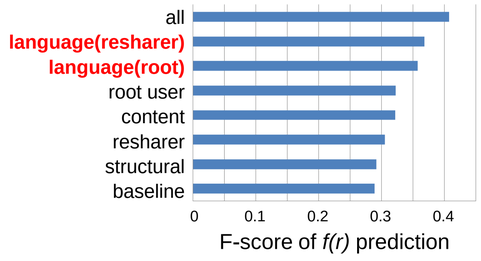
1. **Data**
   - *** Train-set:** 300,000 cascades (the root tweets appeared 6/1 ~ 6/21)
   - *** Test-set:** 100,000 cascades (the root tweets appeared 6/22 ~ 6/28)
2. **Results**

*** Influential cross-lingual prediction task after observing 10 resharers**

$f(k)$	$f(r)$	model	Precision	Recall	F-score
>median	-	baseline	0.51	1	0.67
		our model	0.68	0.78	**0.73**
-	$>r$	baseline	0.17	1	0.29
		our model	0.29	0.71	**0.41**
>median	$>r$	baseline	0.13	1	0.23
		our model	0.27	0.58	**0.37**

*** Feature importance**





Future work

1. Improve topic-based language models
2. Extract structural properties of cascades of differing levels of cross-lingualism

Contact jhs@tkl.iis.u-tokyo.ac.jp for more information.