FiND: A Real-time Filtering by Novelty and Diversity for Publish/Subscribe Systems

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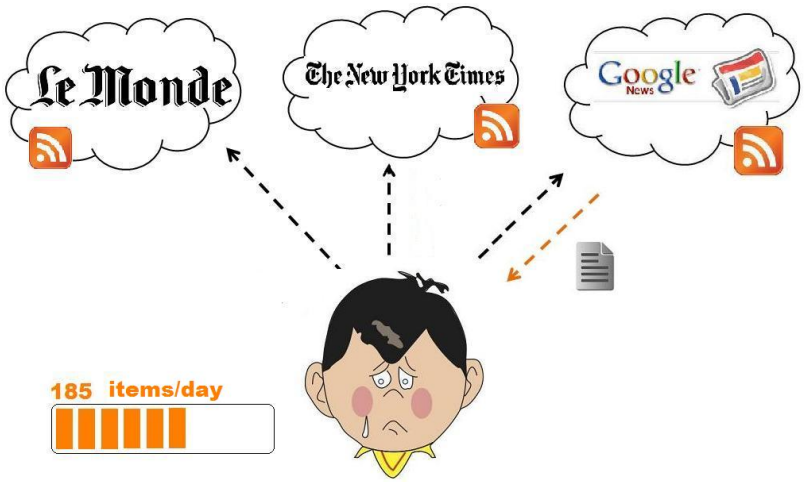
Information delivery problem



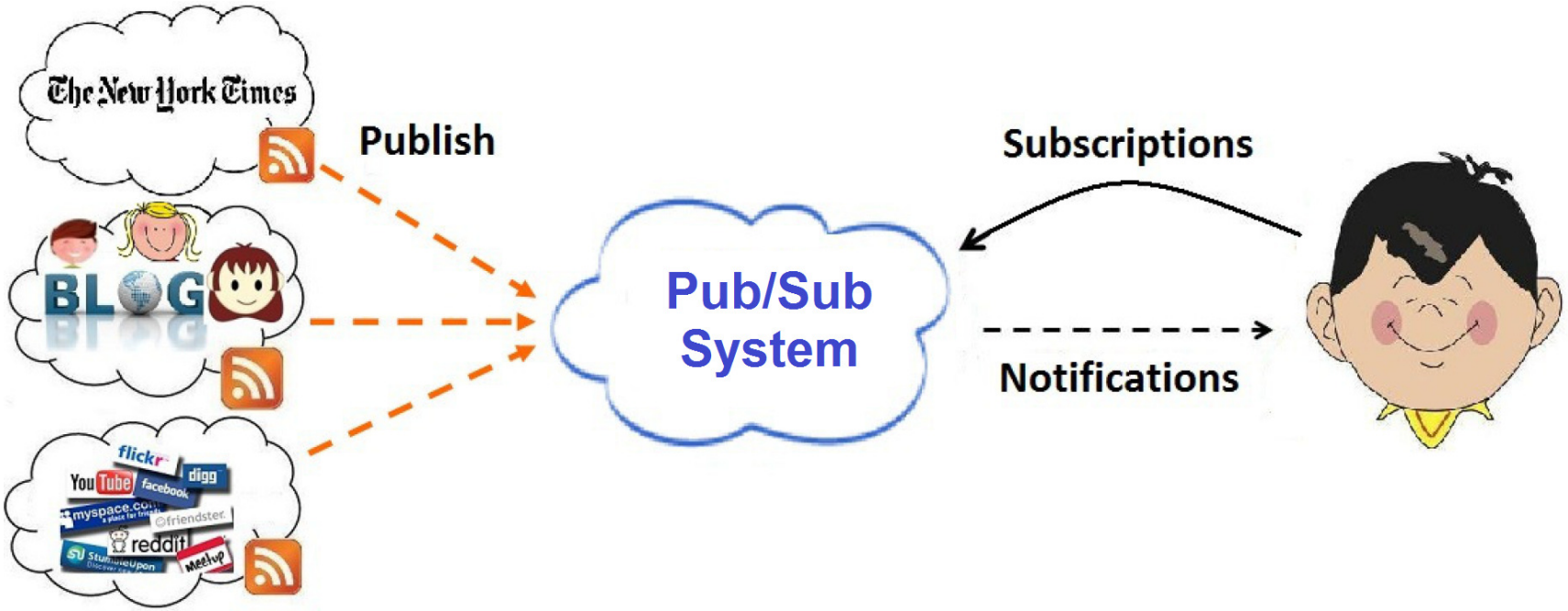
Large number of sources + high publication rates

Huge volumes of data

Content-based Pub/Sub System for Web Syndication

Problem

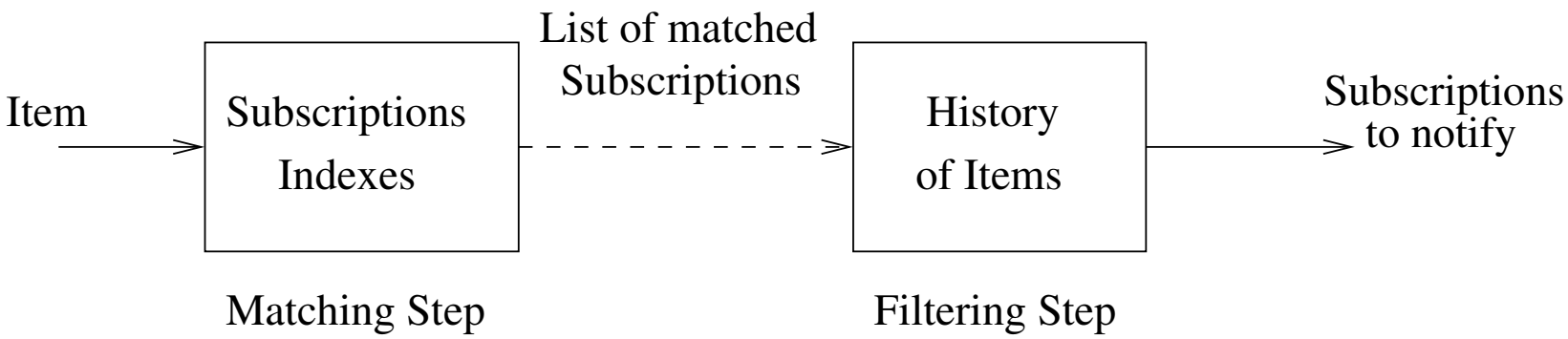
How users can receive only interesting information?



Issue

How can we **efficiently** send **relevant** RSS items to users?

FiND : Filtering by Novelty and Diversity



Two steps

- **Matching**: Items containing subscriptions' terms
  - Index for broadmatch and partial match [EDBT'12]
- **Filtering**:
  - By novelty: Remove redundant information
  - By diversity: Maximize diversification in the delivered information items
- History based:
  - Filtering by received items by the user
  - Sliding window on time (W = 24 hours)

Filtering by Satisfaction: example

Subscription = "Football 2014"

- History
  - Football 2014 Italy
  - Football 2014 France Germany

New incoming items

	Novelty	Diversity
Football 2014 France	X	X
Football 2014 France Italy	√	X
Football 2014 Italy Brazil	√	√

Novelty and Diversity scores

Novelty scores

- Asymetric measure ($\neq$ *Jaccard*)
  - Time dependent
- Text overlap
  - new terms $\rightarrow$ new information
  - Weight terms: term discrimination value (TDV)

Diversity scores

- Increase the average pairwise distance
  - New history versus the old one
  - Diversity(H $\cup$ $I - I_{old}$) $>$ Diversity(H)
  - Efficient computation: O(2) versus O(n)
- Need a distance measure
  - Adapted to short items ($\neq$ *Jaccard* or *cosine*)

  $\Rightarrow$ `Euclidian` distance with weights

Demonstration

Dataset

- Real dataset of 10.7M items
- 100M Subscriptions automatically generated (Alias sampling method, with Google distribution)

Demonstrations highlights

- Impact of different parameters on time and result set of S
- Creation of S, set novelty threshold and diversity's impact
- Result set's quality: compared to the top-k algorithm

Thanks for your attention!

Questions?