A Simple Approach for Author Profiling in MapReduce

Suraj Maharjan, Prasha Shrestha, and Thamar Solorio

University of Alabama at Birmingham

Department of Computer and Information Sciences

Birmingham, Alabama 35294-1170, USA

{suraj, prasha, solorio}@cis.uab.edu

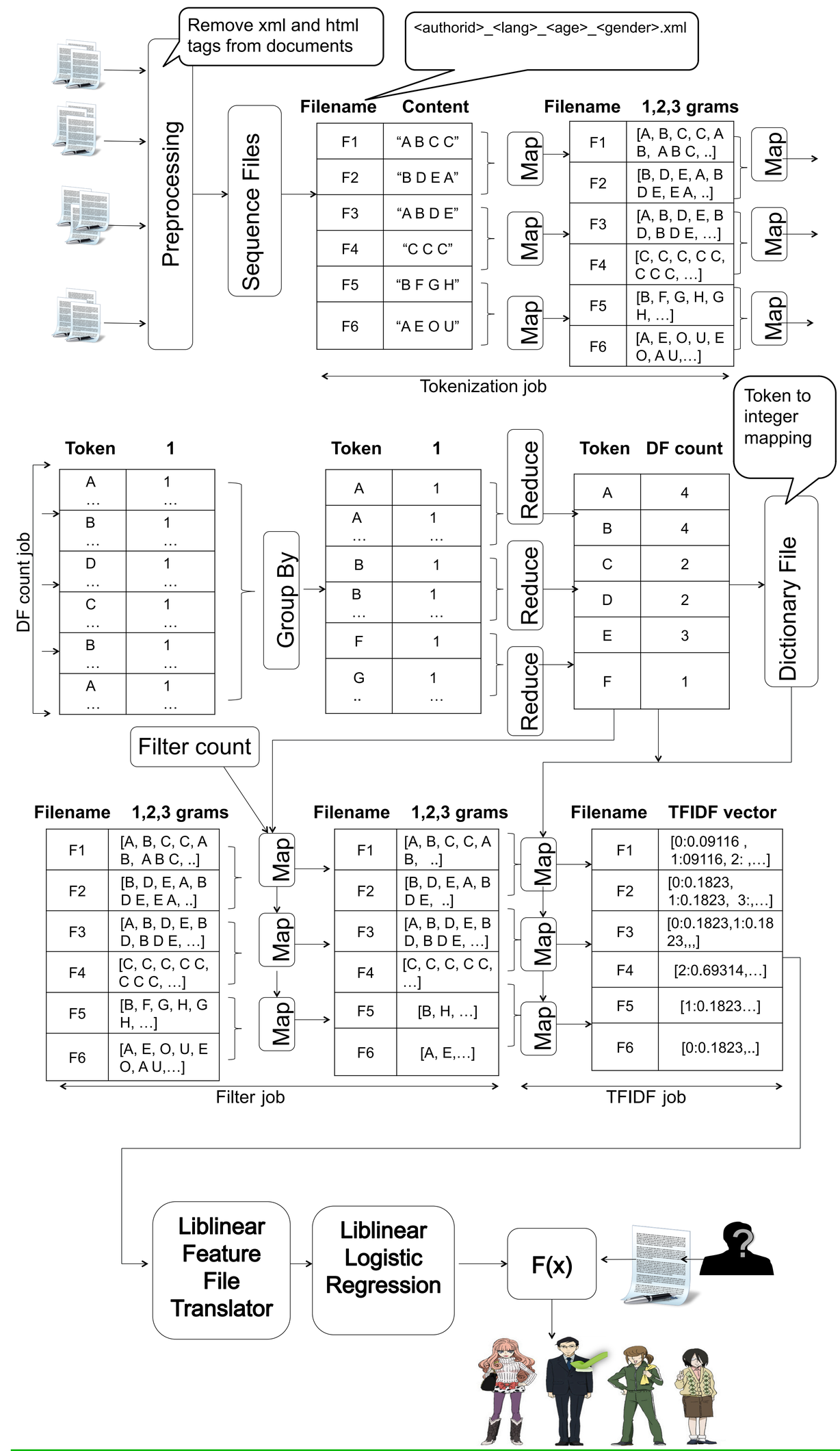
Task

- Given: an anonymous text
- Predict: author's age group [18-24 | 25-34 | 35-49 | 50-64 | 65-plus]
  author's gender [male | female]
- Provided: Training data in English and Spanish
  - English – Blog, Reviews, Social Media, and Twitter
  - Spanish – Blog, Social Media, and Twitter

Features Considered

- Word *n*-grams: unigrams, bigrams, and trigrams combined
- Retained stop words, emoticons, punctuation marks
- Tokenized using CMU ARK Tweet Part-of-Speech Tagger
- An *n*-gram must be used by at least two authors to be considered as a feature

System Workflow



Experiments on Training Data

- Local Hadoop cluster with one master node and seven slave nodes
- Each node has 16 cores and 12 GB memory
- Training data split into 70:30 ratio for training and development
- Modeled as 10 class classification problem

Classification Algorithm	English (%)				Spanish (%)		
	Blogs	Reviews	Social Media	Twitter	Blog	Social Media	Twitter
Naïve Bayes	27.50	21.55	20.62	28.89	55.00	20.48	34.78
Cosine similarity	20.00	23.64	19.72	27.78	35.00	26.33	36.96
Weighted Cosine Similarity	30.00	23.16	19.97	26.67	40.00	22.07	32.61
Logistic Regression	27.50	23.08	20.62	33.33	35.00	25.80	32.61
SVM	25.00	22.28	19.80	32.22	30.00	26.33	34.78

Table 1: Accuracy for word *1, 2, 3* -grams for cross validation dataset.

Classification Algorithm	English (%)				Spanish (%)		
	Blogs	Reviews	Social Media	Twitter	Blog	Social Media	Twitter
Naïve Bayes	25.00	18.99	18.33	24.44	40.00	19.68	23.91
Cosine similarity	20.00	21.63	17.90	30.00	50.00	21.81	26.09
Weighted Cosine Similarity	20.00	21.15	16.78	23.33	40.00	19.68	28.26
Logistic Regression	22.50	21.71	16.78	25.56	35.00	23.67	17.39
SVM	20.00	20.83	15.92	24.44	35.00	23.14	17.39

Table 2: Accuracy for character *2, 3* -grams for cross validation dataset.

Classification Algorithm	English (%)		Spanish (%)	
	Separate Models	Single Model	Separate Models	Single Model
Naïve Bayes	21.21	20.13	23.53	21.04
Cosine similarity	19.89	17.34	27.83	27.60
Weighted Cosine Similarity	21.32	18.18	23.98	24.89
Logistic Regression	21.83	21.92	26.92	28.96
SVM	20.99	20.48	27.37	28.05

Table 3: Accuracy for single and separate models for all categories.

Results

- Number of features in English: 7,299,609
- Number of features in Spanish: 1,154,270

Language	Category	Test 1				Test 2			
		Both	Age	Gender	Runtimes	Both	Age	Gender	Runtime
English	Blog	16.67	25.00	54.17	00:01:50	23.08	38.46	57.69	0:01:56
	Reviews	20.12	28.05	62.80	00:01:46	22.23	33.31	66.87	0:02:13
	Social Media	20.09	36.27	53.32	00:07:18	20.62	36.52	53.82	0:26:31
	Twitter	40.00	43.33	73.33	00:02:01	30.52	44.16	66.88	0:02:31
Spanish	Blog	28.57	42.86	57.14	00:00:35	25.00	46.43	42.86	0:00:39
	Social Media	30.33	40.16	68.03	00:01:13	28.45	42.76	64.49	0:03:26
	Twitter	61.54	69.23	88.46	00:00:43	43.33	61.11	65.56	0:01:10

Table 4: Accuracy by category and language on test dataset. (1st 2nd 3rd)

System	Average Accuracy(%)
PAN'14 Best	28.95
Ours	27.60
Baseline	14.04

Table 5: Accuracy comparison with other systems.

Conclusion

- Word *n*-grams proved to be better features than character *n*-grams for this task
- MapReduce is ideal for feature extraction from large dataset
- Our system works better when there is a large dataset
- Simple approaches do work

Partially supported by

NSF

ONR Science & Technology

CLEF'14, 15-18 September, Sheffield - UK