Predicting age and gender of artists based on songs and lyrics

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Project overview

1. Introduction
2. Data downloading
3. Dataset preparation
4. Data analysis
5. Age and gender prediction

Data downloading

Spotify®

MusicBrainz

musiXmatch®
not only words

WIKIDATA

Dataset

Musicbrainz artist:
- id
- name
- year
- area (country)
- albums

Spotify artist:
- popularity
- followers
- genres
- albums

Spotify songs features:
- danceability
- loudness
- violence
- instrumentalness
- ...

Lyrics
- bag of words
- 5000 most popular

Dataset preparation

Dataset merging

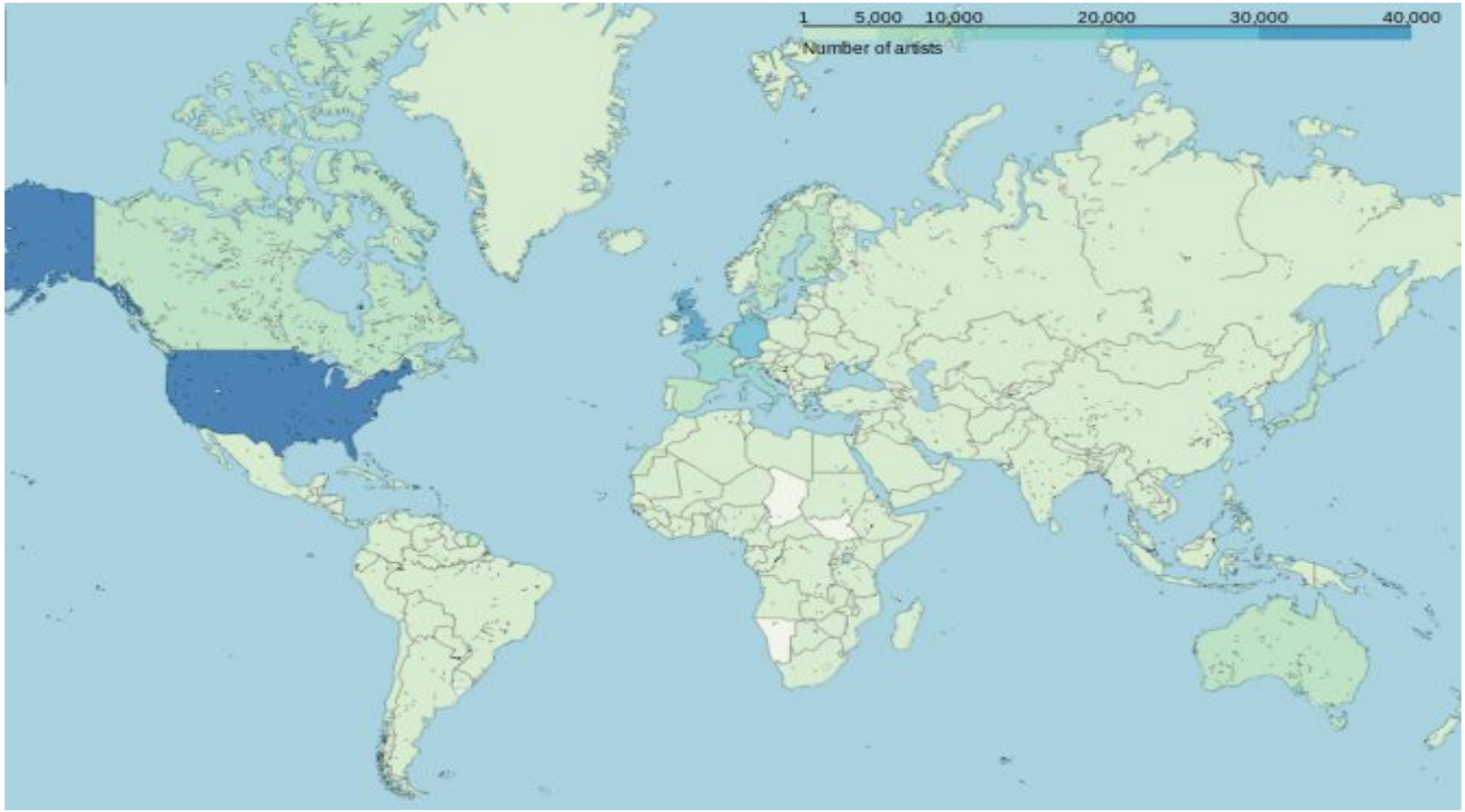
1. Using direct ids
2. Using edit distance on names and albums

Data preprocessing

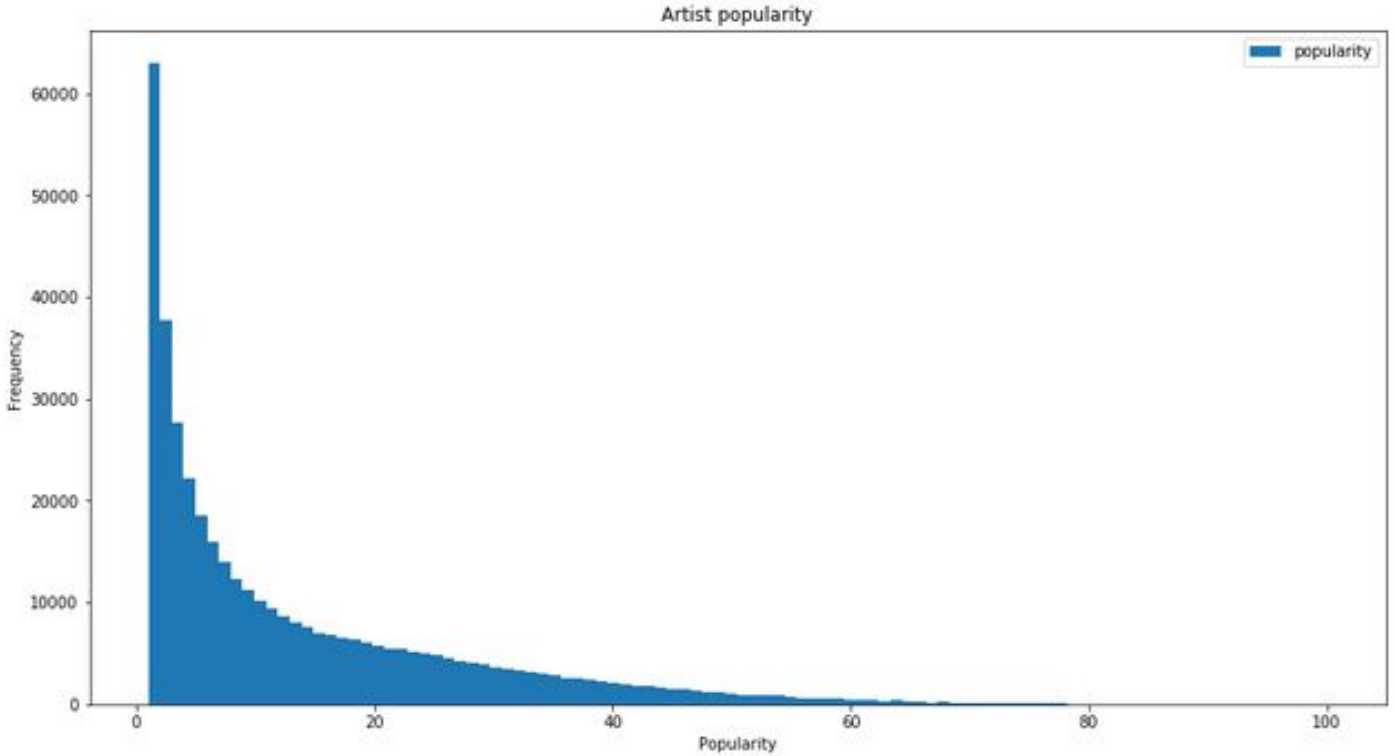
1. Lyrics - tf-idf
2. Songs features - averaged over all songs of one artist
3. Genres - reduced from 1600 to 600

	followers	popularity	danceability	energy	key	loudness	mode	speechiness	instrumentalness	liveness	valence	gender	age	lyrics	genres
0	3752.0	61.0	0.5459	0.440100	6.4	-9.4249	0.8	0.14020	3.180000e-07	0.15880	0.65750	2.0	38.0		(0, 417)\t1.0
1	1361.0	29.0	0.6975	0.554100	5.8	-11.2578	0.4	0.04146	7.196700e-01	0.09388	0.69470	2.0	58.0		(0, 201)\t1.0
80	18.0	22.0	0.2168	0.197430	5.5	-17.0261	0.7	0.04539	7.174316e-01	0.22717	0.08244	2.0	58.0		
93	9.0	14.0	0.2470	0.076460	7.1	-22.4985	0.7	0.04495	6.515000e-01	0.11944	0.11742	2.0	51.0		
98	40.0	20.0	0.3998	0.054605	6.8	-27.5582	0.6	0.04613	9.059000e-01	0.09894	0.21079	1.0	91.0		

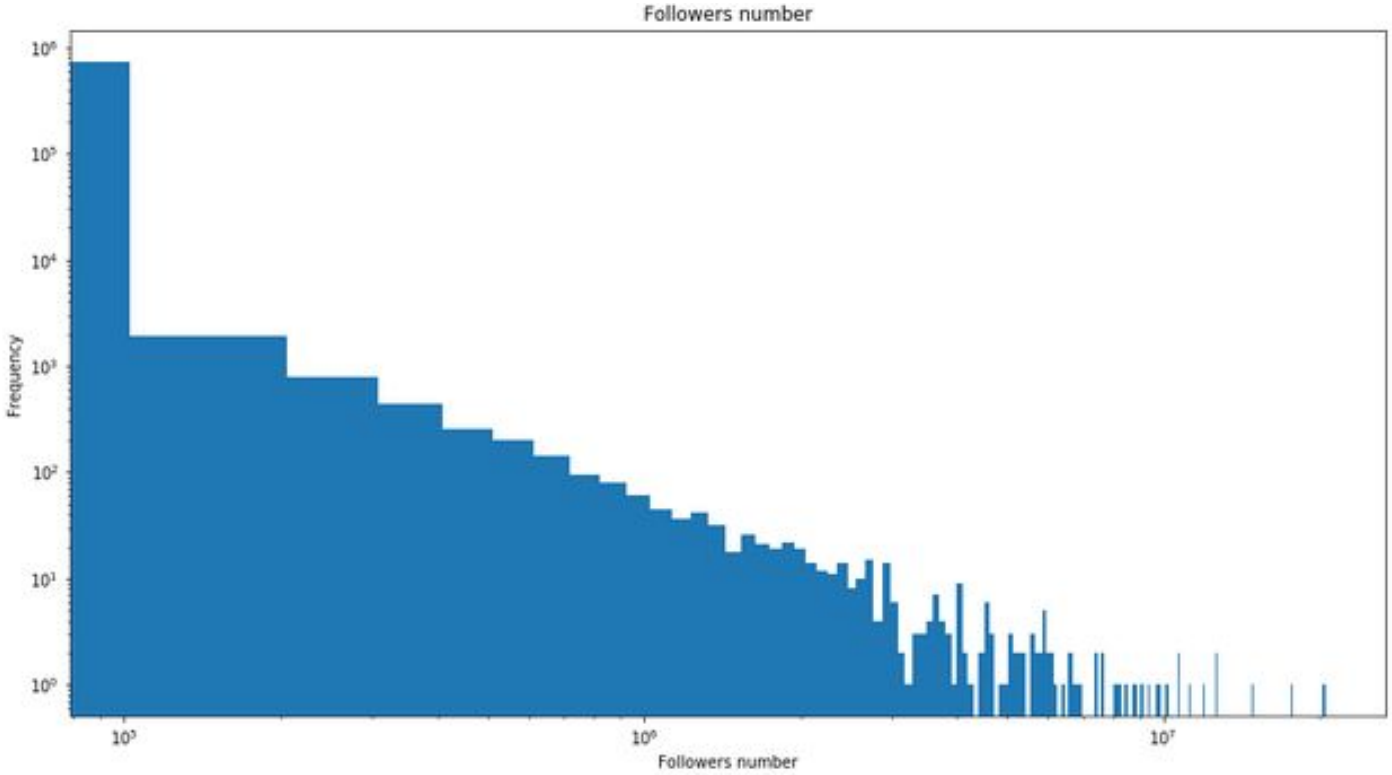
Artists by country



Data analysis - artist popularity

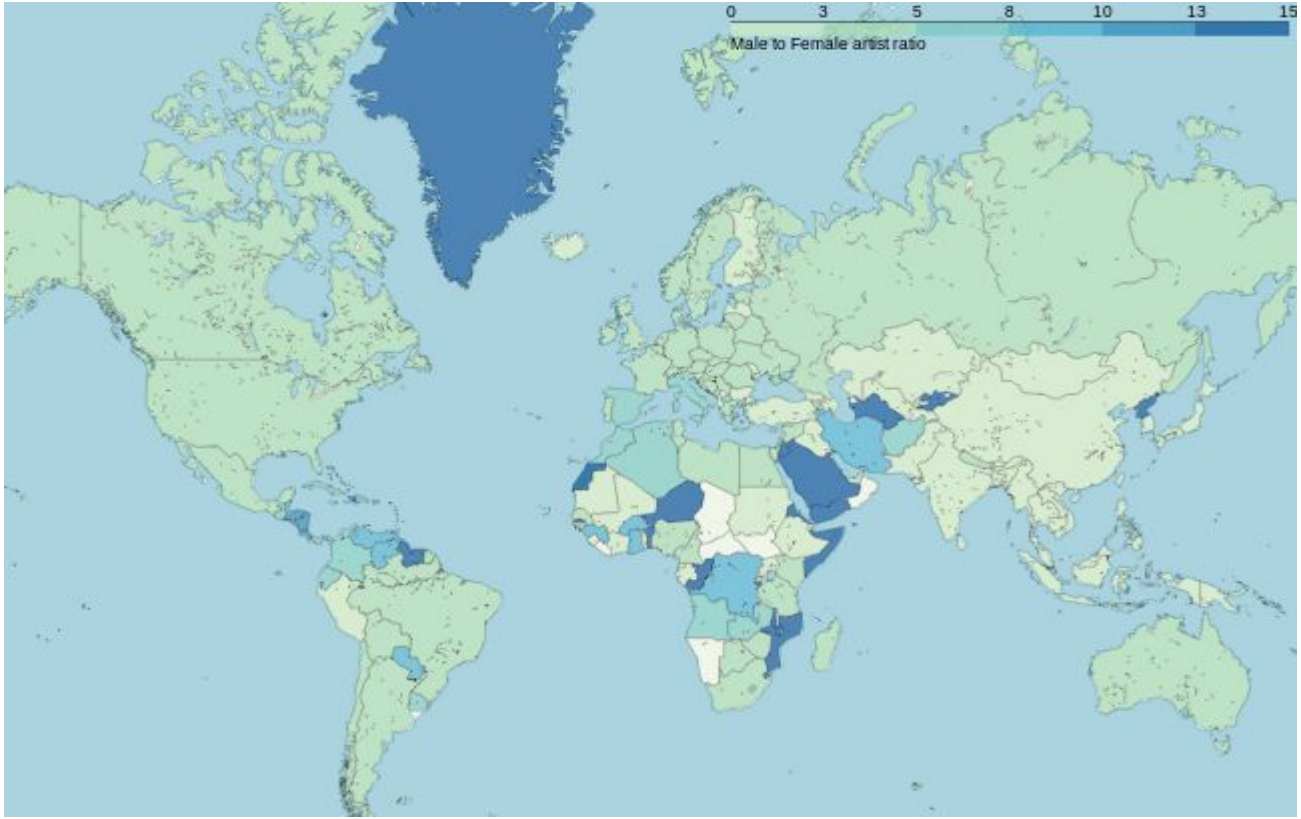


Data analysis - followers

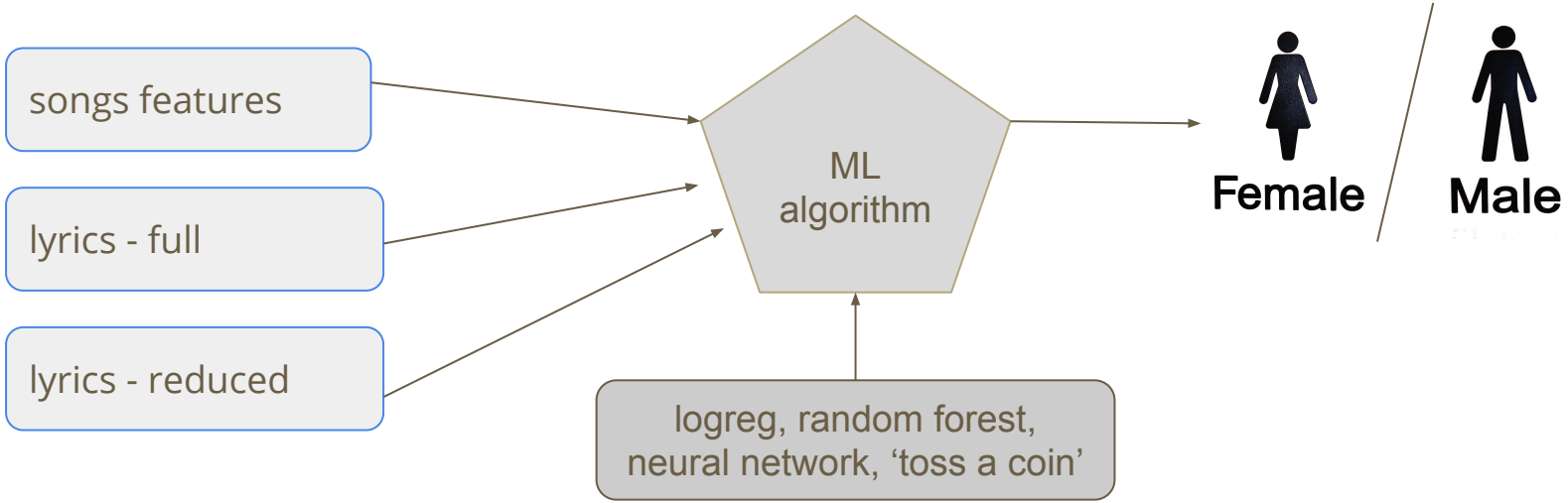


Data analysis - gender

Gender	Number
unknown	525709
Male	382694
Female	104242
Other	541



Gender prediction



Gender prediction - results

1. Baseline - ‘toss a coin’
   accuracy - 65%

2. Random forest - only songs features:
accuracy - 79%

	precision	recall	f1-score	support
0	0.57	0.13	0.21	8570
1	0.80	0.97	0.88	30335
avg / total	0.75	0.79	0.73	38905

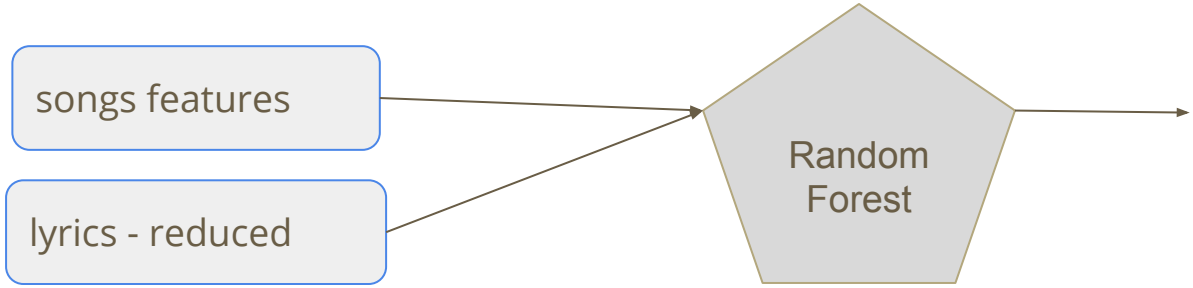
3. Random forest - songs and full lyrics:
accuracy - 71%

	precision	recall	f1-score	support
0	0.34	0.70	0.46	8570
1	0.88	0.62	0.73	30335
avg / total	0.76	0.64	0.67	38905

4. Random forest - songs and reduced lyrics:
accuracy -78%

	precision	recall	f1-score	support
0	0.61	0.12	0.20	8570
1	0.80	0.98	0.88	30335
avg / total	0.76	0.79	0.73	38905

Age prediction



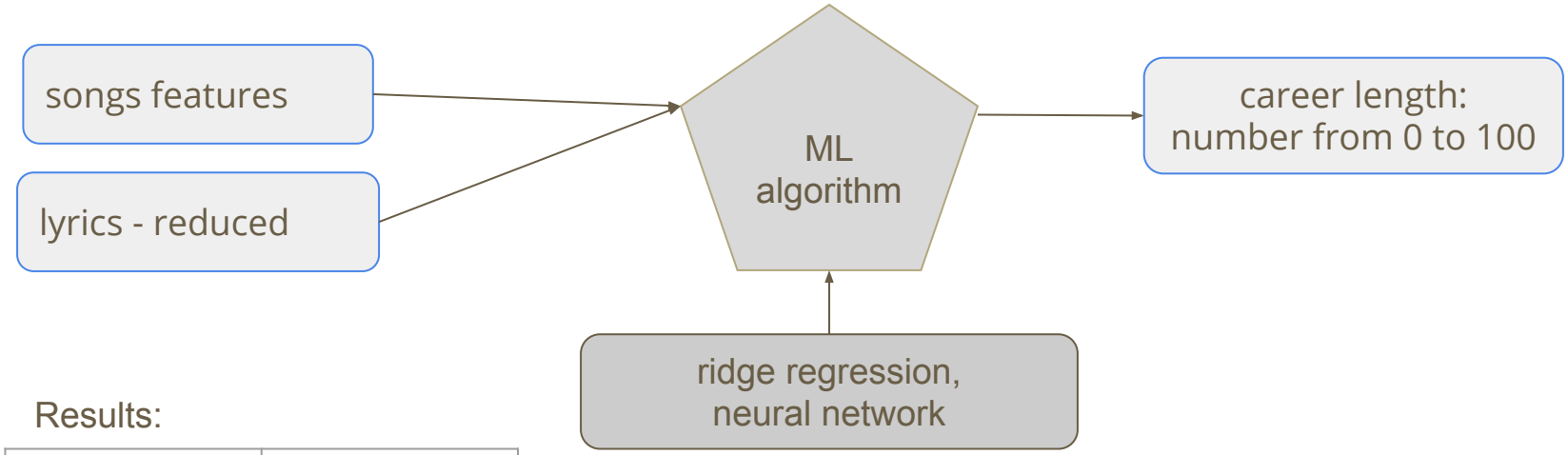
class	age
0	0-40
1	41-57
2	58-78
3	79-...

Confusion matrix:

```
[3821,   93,   17,   75]
[3932,  296,   67,  197]
[3593,   42,  274,  415]
[2468,    7,   67, 2019]
```

	precision	recall	f1-score	support
0	0.69	0.40	0.51	4006
1	0.68	0.07	0.12	4492
2	0.64	0.06	0.12	4324
3	0.75	0.44	0.56	4561
avg / total	0.69	0.24	0.32	17383

Career length predicition



Results:

algorithm	MAE
ridge reg.	6,04
NN	5,68

Summary

- Predicting age and gender - not an easy task
- Career length prediction - promising results, possible improvements
- More information and details of the project: https://github.com/mkuziora/PredictingAgeAndGenderOfArtists