Homepage2Vec:
Language-Agnostic Website Embedding and Classification

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PROBLEM

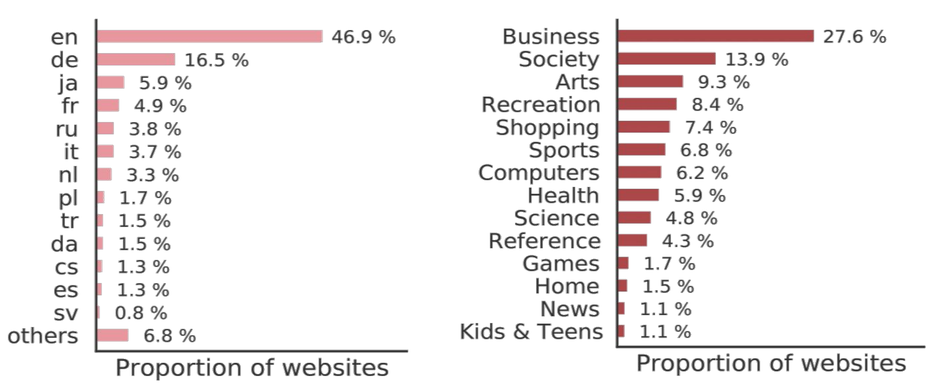
Currently, publicly available models for website classification do not offer an embedding method and have limited support for languages beyond English.

CURLIE DATASET

Curlie is an multilingual community-edited Web directory. We release the data collected in April 2021.

The dataset contains **2.28M URLs** of home pages with their respective **original HTML** content covering **92 languages**.

Each URL is assigned to its language-specific categories, as well as the respective **14 English-specific labels**.



Distribution of classes and languages in the pre-processed curlie dataset

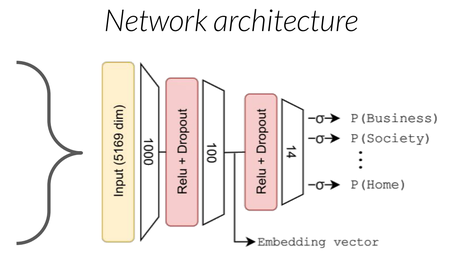
HOMEPAGE2VEC

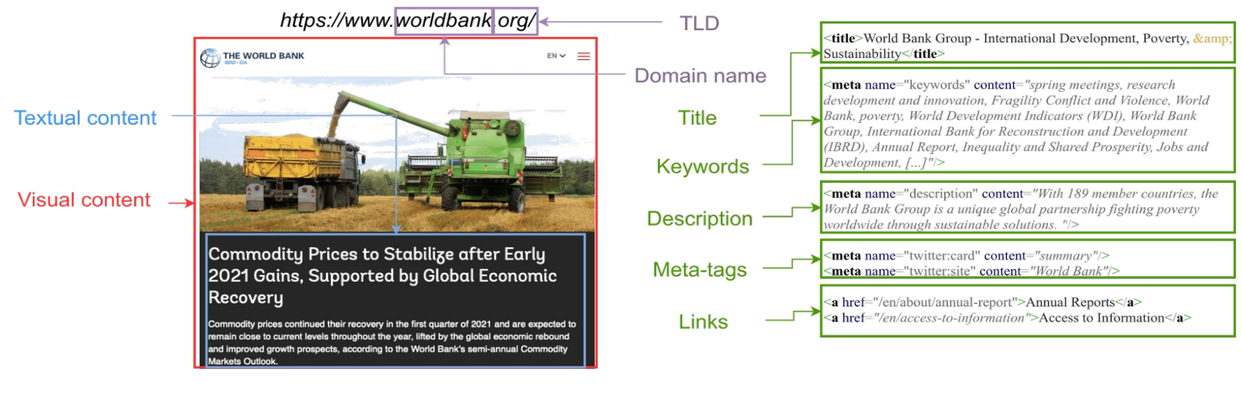
Homepage2Vec, a multilingual model trained on Curlie dataset that can **classify and embed** any website using the homepage features.

We trained a neural network using four types of features available in the Curlie dataset that represent the different aspects of the website:

- Domain name–based
- Textual content
- Visual content
- HTML metadata–based

Network architecture

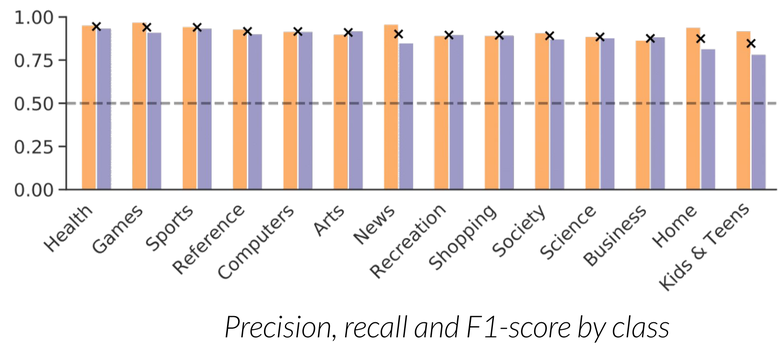




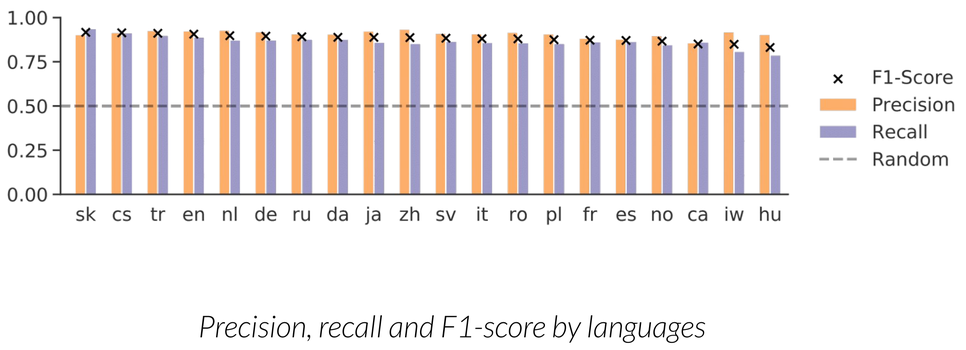
Features used to train Homepage2Vec, grouped into four categories: textual (blue), visual (red), domain name (purple), and HTML metadata (green)

HOMEPAGE2VEC EVALUATION

Evaluated on a balanced test set Homepage2vec achieves a macro-average **F1 score of 0.90.**
The model has **stable performances across** low- as well as high-resource **languages**.



Precision, recall and F1-score by class



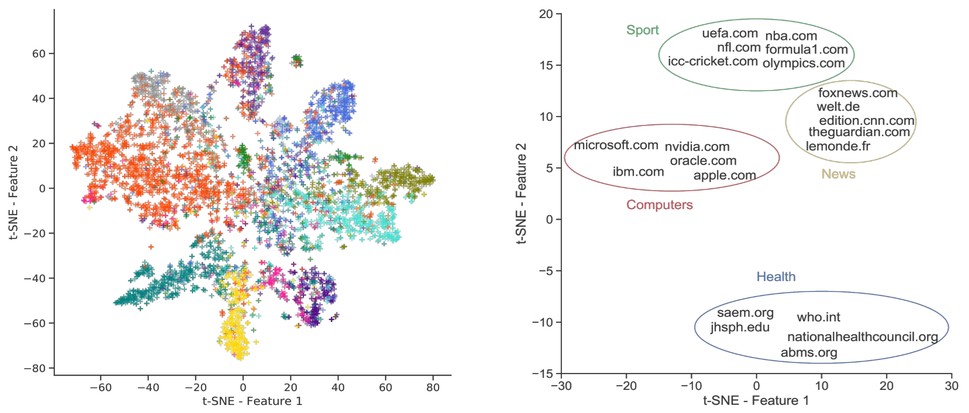
Precision, recall and F1-score by languages

APPLICATIONS

Curlie Dataset and Homepage2Vec are released with a Python library that allows classification and embedding from arbitrary URLs or prefetched HTML content.

```
pip install homepage2vec
```

```
from homepage2vec.model import WebsiteClassifier
model = WebsiteClassifier()
website = model.fetch_website('epfl.ch')
scores, embeddings = model.predict(website)
```



t-SNE projection of the test set, as well for known websites

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Homepage2Vec Python library

Curlie dataset