

Point-of-Interest Type Inference from Social Media Text



Danae Sánchez Villegas¹, Daniel Preoțiuc-Pietro², Nikolaos Aletras¹

1: Computer Science Department, University of Sheffield, UK

2: Bloomberg, New York, US

Motivation

- Social networks allow users to post from different physical locations aka Points-of-Interest (POIs)
- Posts and POIs
 - Experiences in a POI trigger ...

Example

... expression of feelings related to a certain place

i'm back in central park. this place gives me war flashbacks now lol

2:23 PM · Sep 10, 2016 from Strawberry Fields · Twitter for iPhone

Source: https://twitter.com/niaz_nyc/status/774674680993214464



Source: <https://twitter.com/marcusrebelo94/status/1189592556893626369>

Example

... comments and thoughts associated with the place they are in

Chicago really needs to step up their Aloha shirt game. Only a few of us dressed "appropriately" tonight. :) 🙄



7:58 PM · Apr 30, 2017 from Three Dots and a Dash · Twitter for iPhone

Source: <https://twitter.com/Ladewig/status/858832967610880001>



Source: <https://twitter.com/ScumWizard/status/1172711836636143616>

Example

... descriptions of activities they are performing

Excited to attend my first [#KySTE2020](#) conference!
Great opportunity to learning more about the wide world of [#edtech](#)!



1:28 PM · Mar 11, 2020 [from Galt House Hotel](#) · Twitter for iPad

Source: <https://twitter.com/MrHarveyEdTech/status/1237732140613357568>

Motivation

- Social networks allow users to post from different physical locations aka Points-of-Interest (POIs)
- Posts and POIs
 - Experiences in a POI trigger feelings, comments and descriptions
 - Posts contribute to shaping the atmosphere of that POI

Example

Posts contribute to shaping the atmosphere of that POI



Source: <https://twitter.com/places/07d9eabceb484001>

POI Type Prediction

We aim to predict the broad type of POI at social media post publication time

Task is Multi-class classification performed at the social media post level

- Post T , $T = \{t_1, \dots, t_n\}$,
- Label T as one of the M POI types

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Arts & Entertainment

⋮

College & University

⋮

Great Outdoors

⋮

Shop & Service

⋮

Applications

- POI Visualization
- POI Recommendation
- Social and cultural geography

Distinct from geo-location prediction:

- Predict type of place (POI)
- Rather than / irrespective of the exact location / coordinates

Data

Contains text and the POI from where it was posted

Locations of tweets are linked to “Places by Foursquare”

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Three Dots and a Dash
Tiki Bar and Hawaiian Restaurant · \$\$\$
Near North Side, Chicago

Tips 223 | Photos 1,426 | Menu

4.7 / 10 1,232 ratings

Given the COVID-19 pandemic, call ahead to verify hours, and remember to practice social distancing

★ Ranked #2 for cocktails in Near North Side

★ The folks at Time Out Chicago and Eater like this place. Would you agree?

📧 "Very cool Tiki Bar hidden within an alley!" (16 Tips)

👤 "STRONG drinks, the Tropical Itch is my favorite." (14 Tips)

👤 "Also, the banana daiquiri is fantastic & very..."

👤 "I got the Jet Pilot." (6 Tips)

Three Dots and a Dash
435 N Clark St (btwn Illinois & Hubbard St)
Chicago, IL 60654
United States
Get directions

Source: <https://foursquare.com/v/three-dots-and-a-dash/51f7183b8bbdc6a6ae21592e>

Data

- 196,235 tweets in English
- 2,761 different POIs in the U.S.
 - Between 10-100 tweets/POI
- 8 POI types

Arts & Entertainment
Nightlife Spot

College & University Professional & Other

Places

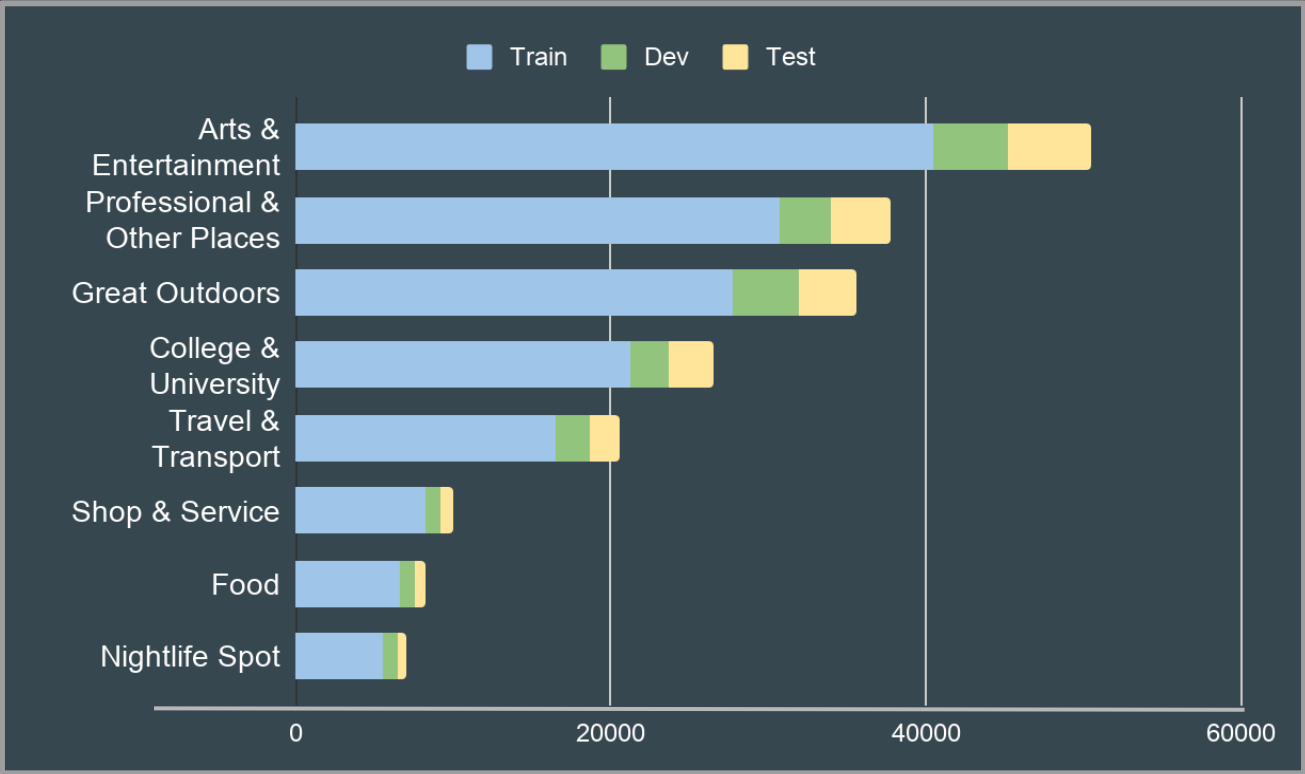
Food

Shop & Service

Great Outdoors

Travel & Transport

Data



Models

Logistic Regression



- LR
- LR-W+T

BiLSTM



- BiLSTM
- BiLSTM-TS

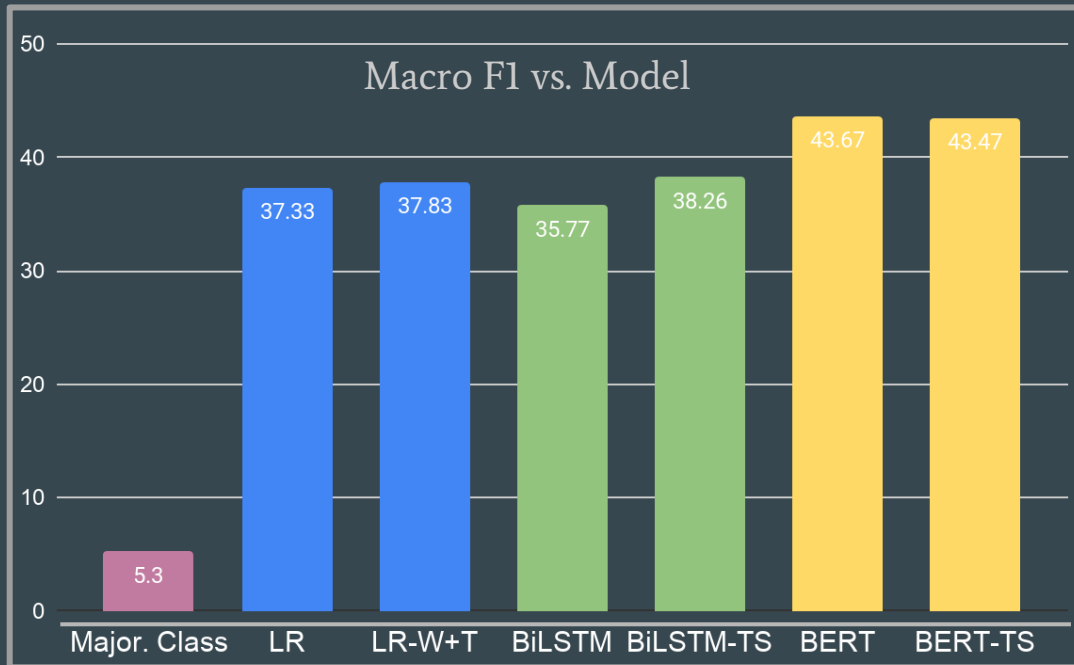
BERT



- BERT
- BERT-TS

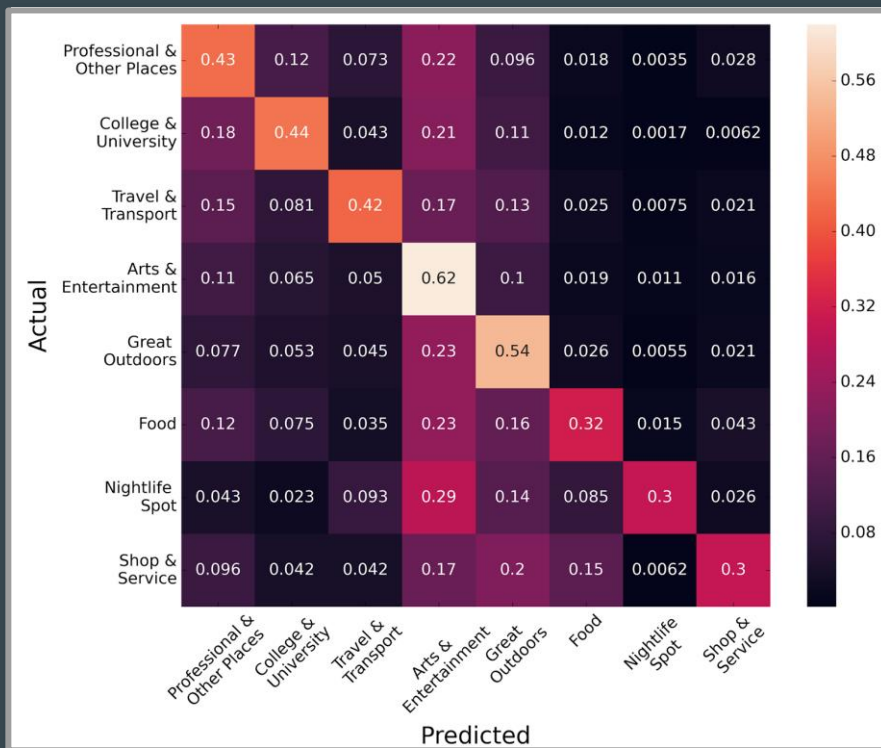
TS/T: Temporal Features

Models and Results



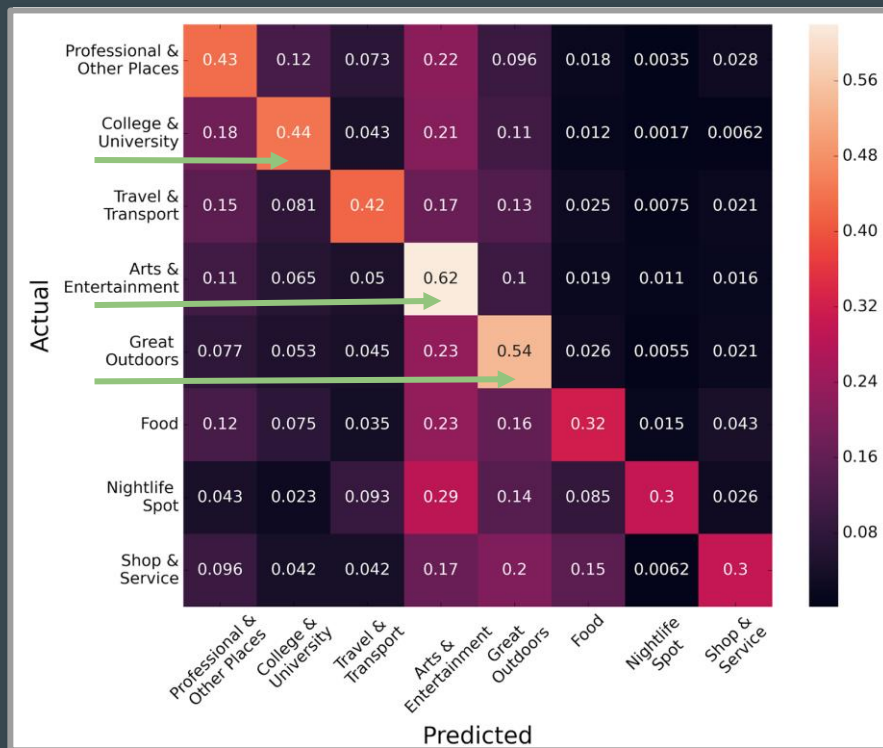
Analysis

Confusion Matrix - BERT

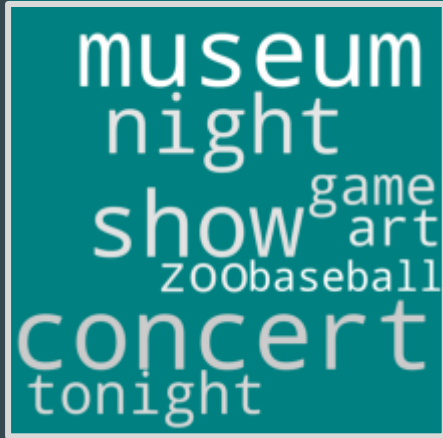


Analysis

Confusion Matrix - BERT



Analysis



Arts & Entertainment

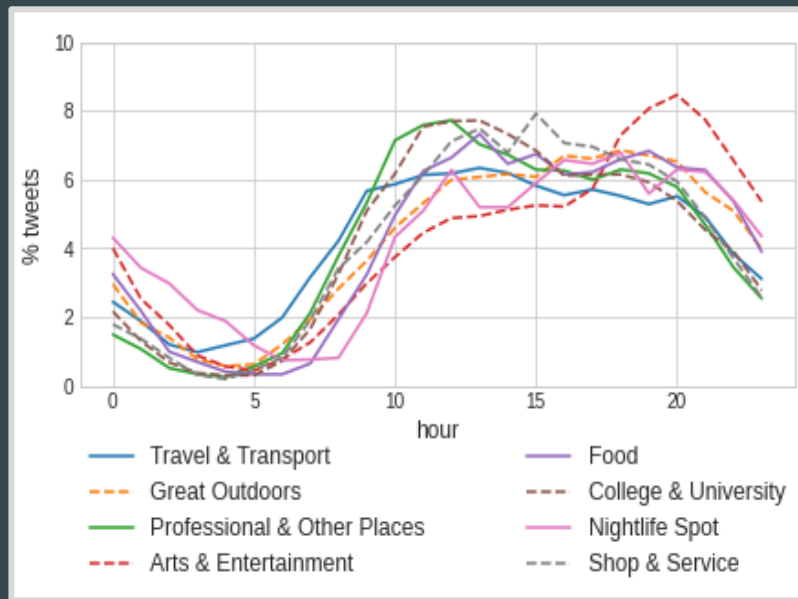


Great Outdoors

Analysis

Arts & Entertainment category peaks around 8 PM

Nightlife Spots present a higher percentage of tweets in the early hours of the day than other categories

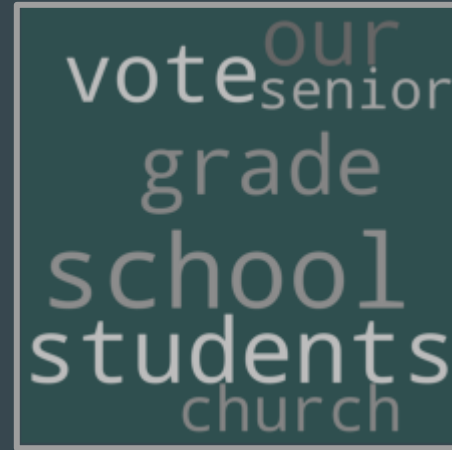


Analysis

The most common error is when the model classifies tweets from the category 'College & University' as 'Professional & Other Places'



College & University



Professional & Other Places

Takeaways

- We presented the first **study on point-of-interest type** prediction from social media text
- Released a **data set** with **tweets** mapped to their **POI category**
- Trained **predictive models** to infer the POI category using:
 - Tweet text
 - Tweet text and posting time
- **Data analysis** of tweet content



<https://archive.org/details/poi-data>