

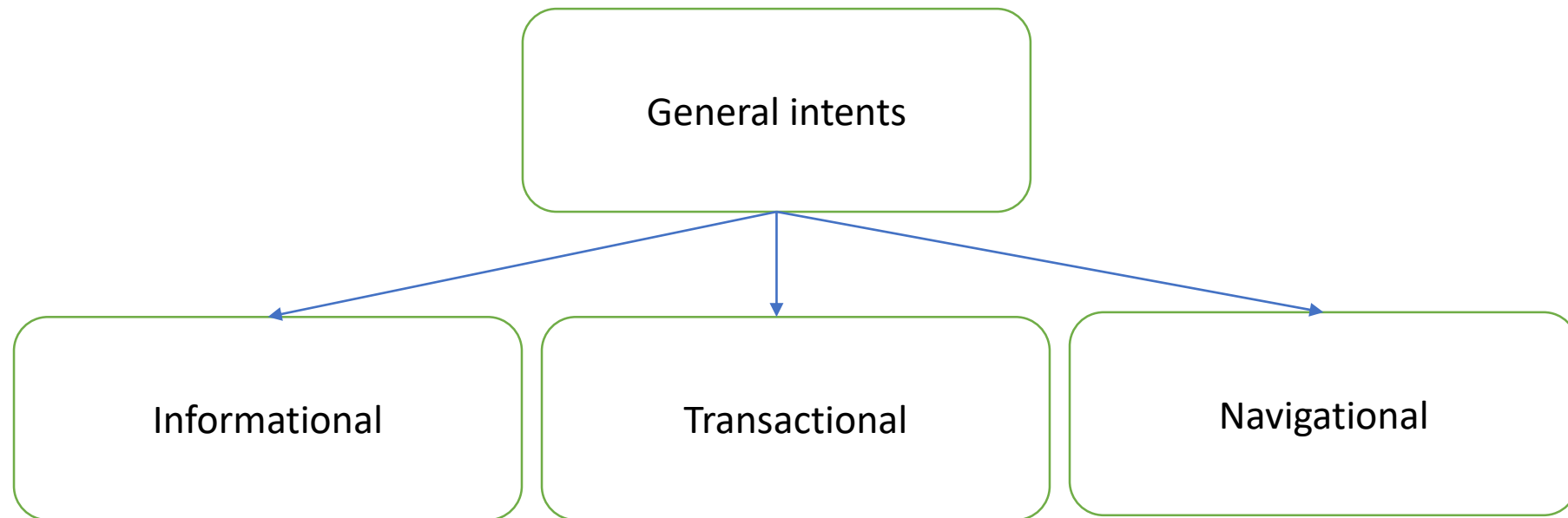
Predicting User Intent based on Search Queries

Kiyan Rezaee – 13 July 2022

Technical background

- ANN
- RNN
- NLP
- LDA Topic Modeling

Types of general intents



The SNIPS

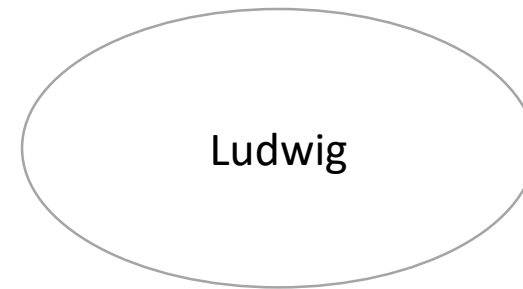
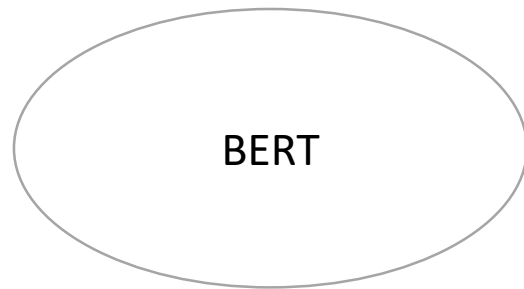
- 16000 queries
 1. SearchCreativeWork
 2. GetWeather
 3. BookRestaurant
 4. PlayMusic
 5. AddToPlaylist
 6. RateBook
 7. SearchScreeningEvent

ATIS dataset

- It contains 8 unique intent categories
 1. atis_flight
 2. atis_flight_time
 3. atis_airfare
 4. atis_aircraft
 5. atis_ground_service
 6. atis_airline
 7. atis_abbreviation
 8. atis_quantity

Balanced vs Unbalanced datasets

Model



Metrics

- Precision
- Recall
- F1-score
- Confusion matrix

Results...

	precision	recall	f1-score	support
PlayMusic	0.89	1.00	0.94	86
AddToPlaylist	1.00	1.00	1.00	124
RateBook	1.00	1.00	1.00	80
SearchScreeningEvent	0.89	0.94	0.92	107
BookRestaurant	0.99	1.00	0.99	92
GetWeather	0.99	0.99	0.99	104
SearchCreativeWork	0.94	0.79	0.86	107
accuracy			0.96	700
macro avg	0.96	0.96	0.96	700
weighted avg	0.96	0.96	0.96	700

Table 4.1: BERT evaluation metric SNIPS

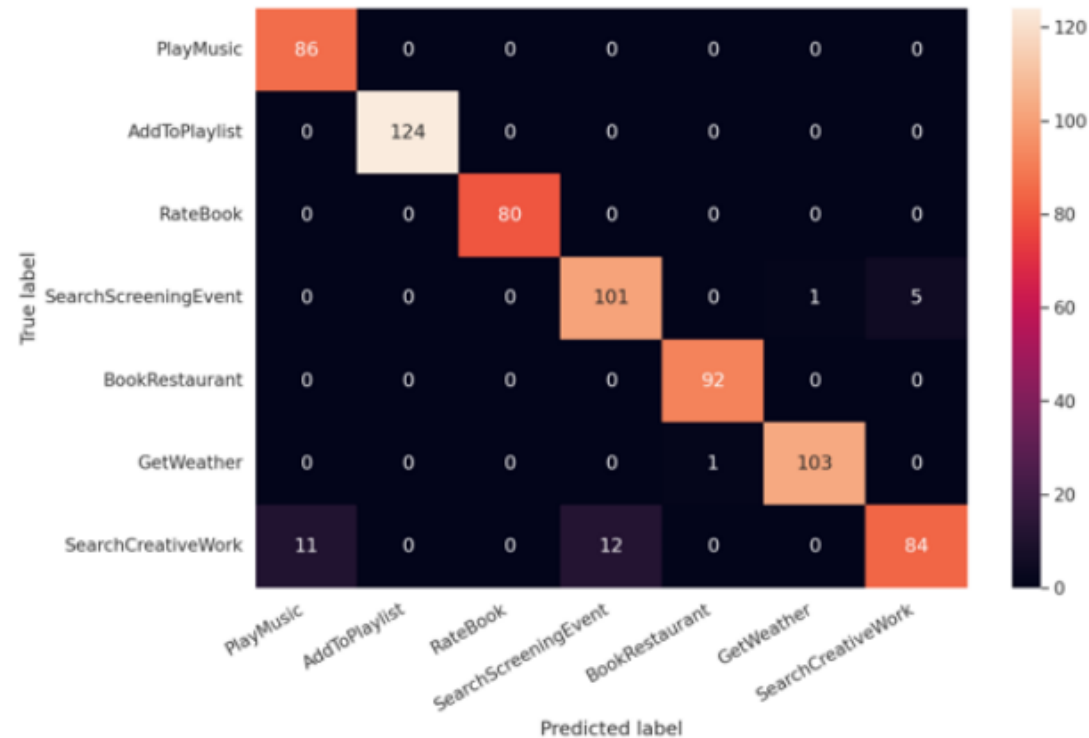


Figure 4.1: BERT confusion matrix SNIPS

Results...

	precision	recall	f1-score	support
intents	0.00	0.00	0.00	1
atis_flight	0.79	1.00	0.88	632
atis_flight_time	0.00	0.00	0.00	1
atis_airfare	0.00	0.00	0.00	48
atis_aircraft	0.00	0.00	0.00	9
atis_ground_service	0.00	0.00	0.00	36
atis_airline	0.00	0.00	0.00	38
atis_abbreviation	0.00	0.00	0.00	33
atis_quantity	0.00	0.00	0.00	3
accuracy			0.79	801
macro avg	0.09	0.11	0.10	801
weighted avg	0.62	0.79	0.70	801

Table 4.2: BERT evaluation metric ATIS

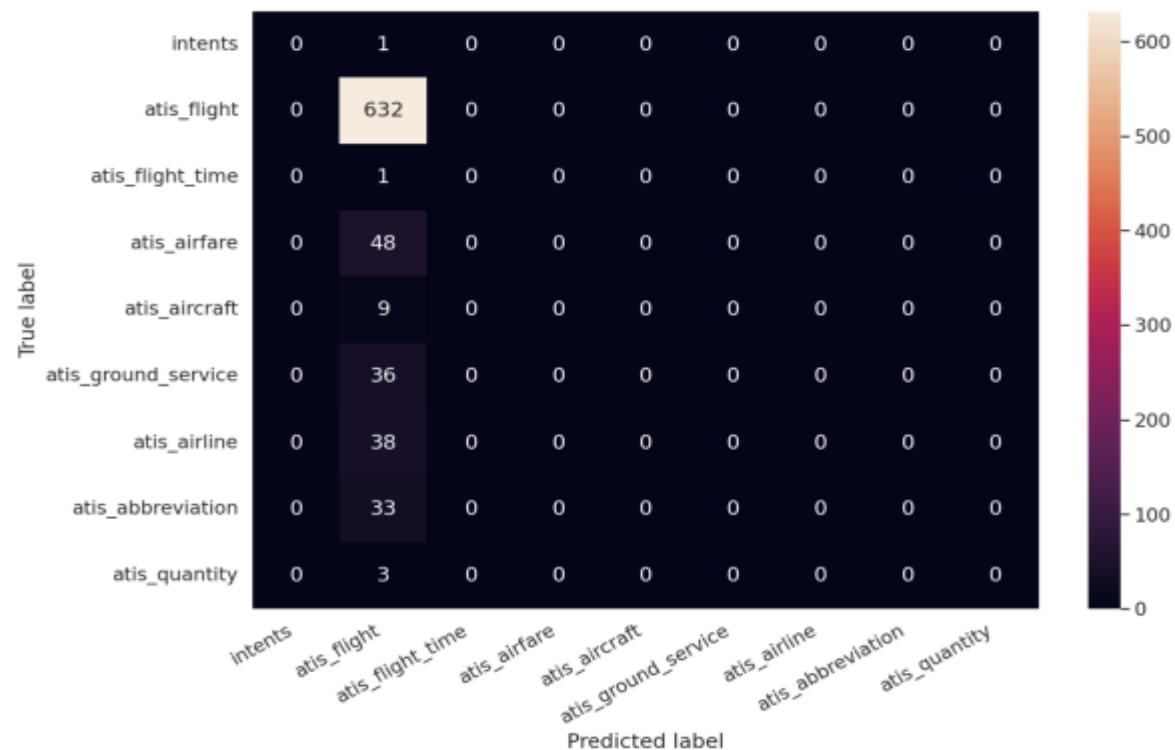


Figure 4.2: BERT confusion matrix ATIS

Results...

intent	loss	accuracy	hits_at_k
train	0.0021	0.9998	1.0000
vali	0.1156	0.9740	0.9968
test	0.0671	0.9793	0.9981

combined	loss
train	0.0021
vali	0.1156
test	0.0671

Figure 4.3: Ludwig evaluation metric SNIPS

intent	loss	accuracy	hits_at_k
train	0.0105	0.9977	0.9997
vali	0.2550	0.9481	0.9679
test	0.1894	0.9659	0.9847

combined	loss
train	0.0105
vali	0.2550
test	0.1894

Figure 4.4: Ludwig evaluation metric ATIS

BERT and Ludwig trained on real-life data

	precision	recall	f1-score	support
Notebooks	0.00	0.00	0.00	86
Webpages	0.27	0.55	0.36	120
Web APIs	0.00	0.00	0.00	83
Software	0.18	0.57	0.28	100
Images	0.00	0.00	0.00	37
Catalogs	0.00	0.00	0.00	57
Datasets	0.00	0.00	0.00	78
accuracy			0.22	561
macro avg	0.06	0.16	0.09	561
weighted avg	0.09	0.22	0.13	561

Table 4.3: BERT evaluation metric real-life queries

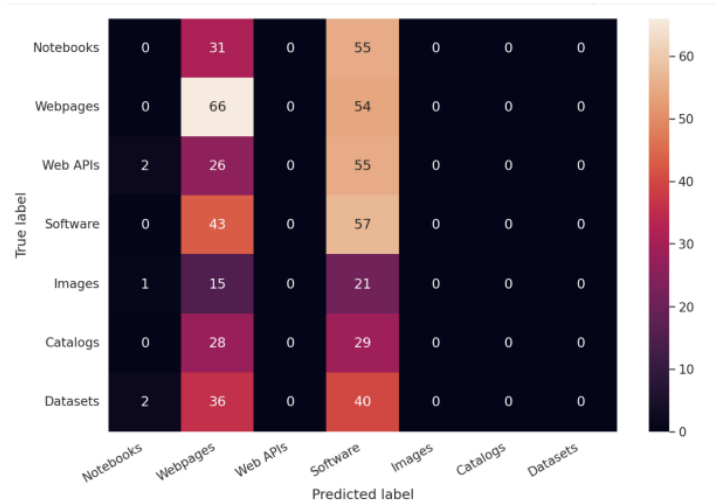


Figure 4.5: BERT confusion matrix real-life data

intents	loss	accuracy	hits_at_k
train	1.9715	0.1414	0.4262
vali	1.9332	0.1500	0.4500
test	2.0170	0.1608	0.4965

combined	loss
train	1.9715
vali	1.9332
test	2.0170

Figure 4.6: Ludwig evaluation metric real-life data