Processamento de Linguagem Natural

Projeto Final - Chatbot com Rasa

Gabriel de Melo Evangelista
Lucas dos Reis Silva
Maria Luísa Leandro de Lima

Centro de Informática UFPE
Universidade Federal de Pernambuco

Classificador e Extrator

Resultados

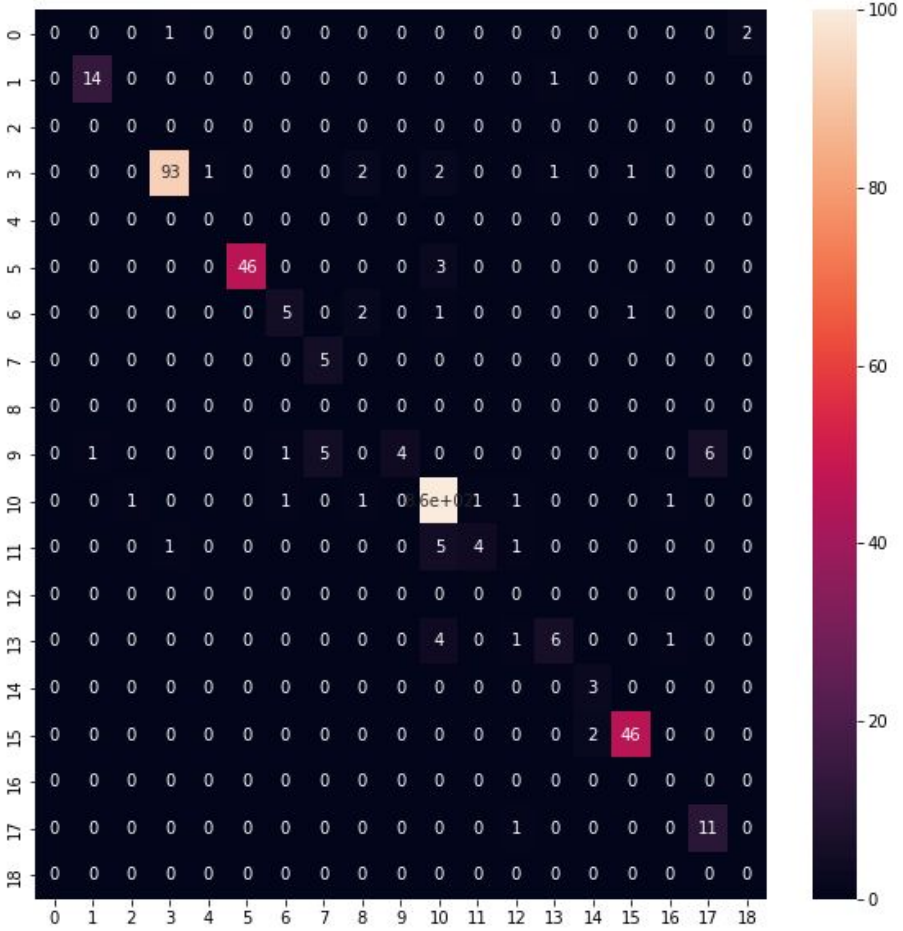
Classificador

```
def create_model(type, embedding_dims, embedding_size, input_length, units, dropout, labels):
    model = Sequential()
    model.add(Embedding(embedding_dims, embedding_size, input_length=input_length))
    model.add(type(units, return_sequences=True)) #p/ mais de uma camada
    model.add(Dropout(dropout))
    model.add(type(units,return_sequences=False))
    model.add(Dropout(dropout))
    model.add(Dense(labels, activation='softmax'))
    return model
```

```
INPUT_LENGTH = 48
EMBEDDING_SIZE = 100
UNITS = 128
DROPOUT = 0.2
### Training parameters
LOSS = "categorical_crossentropy"
OPTIMIZER = "adam"
BATCH_SIZE = 32
EPOCHS = 8
LABELS = 26
EMBEDDING_DIMS = len(dicts['token_ids'])+1
```

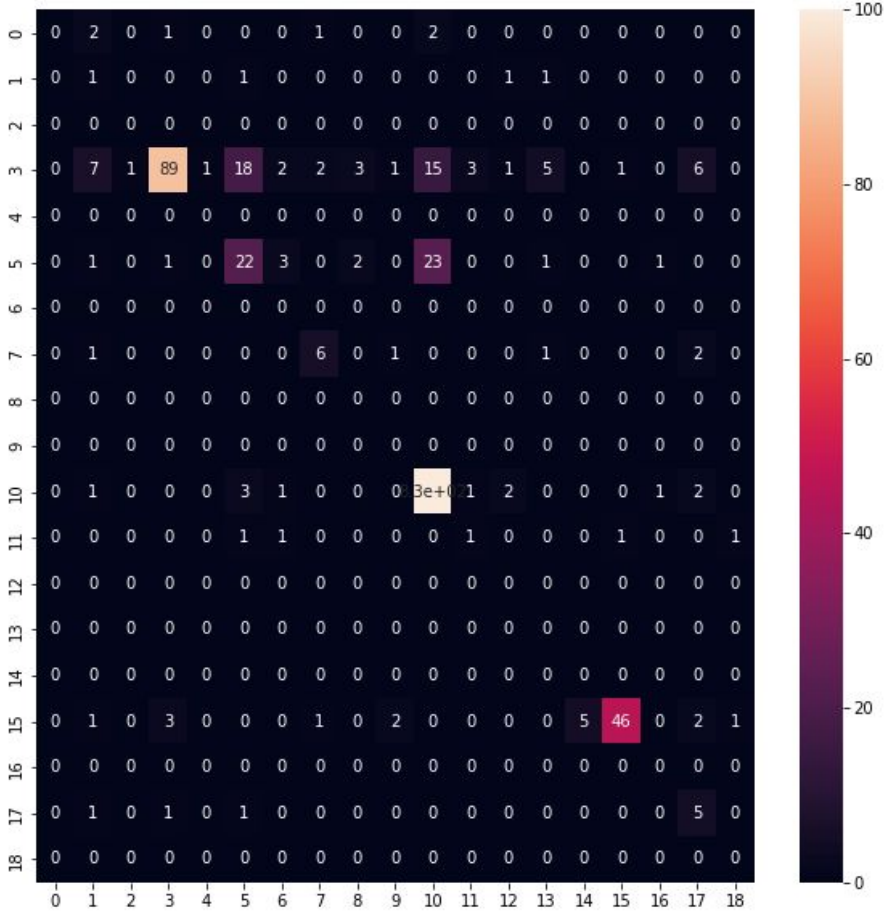
```
Done  loading:  atis.train.pkl
      samples: 4978
   vocab_size:  943
   slot count:  129
 intent count:   26
Done  loading:  atis.test.pkl
      samples:  893
   vocab_size:  943
   slot count:  129
 intent count:   26
```

LSTM



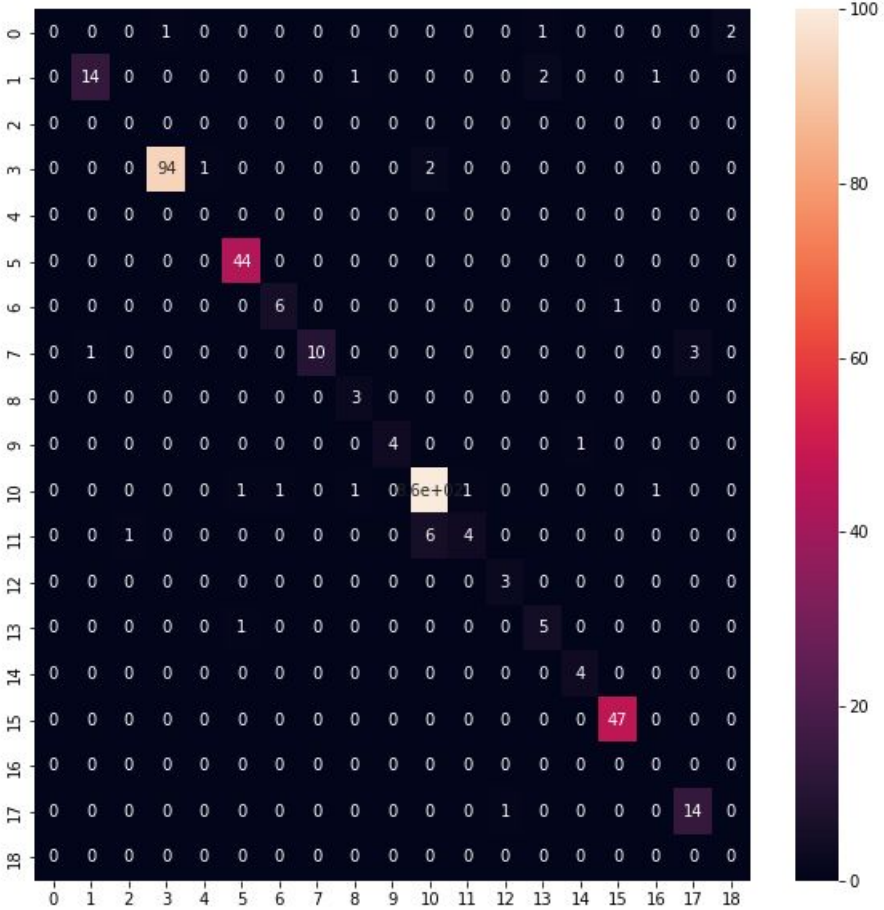
	precision	recall	f1-score	support
0	0.00	0.00	0.00	3
1	0.93	0.93	0.93	15
2	0.00	0.00	0.00	0
3	0.98	0.93	0.95	100
4	0.00	0.00	0.00	0
6	1.00	0.94	0.97	49
8	0.71	0.56	0.63	9
9	0.50	1.00	0.67	5
11	0.00	0.00	0.00	0
13	1.00	0.24	0.38	17
14	0.98	0.99	0.99	863
15	0.80	0.36	0.50	11
17	0.00	0.00	0.00	0
19	0.75	0.50	0.60	12
20	0.60	1.00	0.75	3
21	0.96	0.96	0.96	48
23	0.00	0.00	0.00	0
24	0.65	0.92	0.76	12
25	0.00	0.00	0.00	0
accuracy			0.95	1147
macro avg	0.52	0.49	0.48	1147
weighted avg	0.97	0.95	0.95	1147

RNN



	precision	recall	f1-score	support
0	0.00	0.00	0.00	6
1	0.07	0.25	0.11	4
2	0.00	0.00	0.00	0
3	0.94	0.57	0.71	155
4	0.00	0.00	0.00	0
6	0.48	0.41	0.44	54
8	0.00	0.00	0.00	0
9	0.60	0.55	0.57	11
11	0.00	0.00	0.00	0
13	0.00	0.00	0.00	0
14	0.95	0.99	0.97	843
15	0.20	0.20	0.20	5
17	0.00	0.00	0.00	0
19	0.00	0.00	0.00	0
20	0.00	0.00	0.00	0
21	0.96	0.75	0.84	61
23	0.00	0.00	0.00	0
24	0.29	0.62	0.40	8
25	0.00	0.00	0.00	0
accuracy			0.87	1147
macro avg	0.24	0.23	0.22	1147
weighted avg	0.91	0.87	0.88	1147

GRU



	precision	recall	f1-score	support
0	0.00	0.00	0.00	4
1	0.93	0.78	0.85	18
2	0.00	0.00	0.00	0
3	0.99	0.97	0.98	97
4	0.00	0.00	0.00	0
6	0.96	1.00	0.98	44
8	0.86	0.86	0.86	7
9	1.00	0.71	0.83	14
11	0.60	1.00	0.75	3
13	1.00	0.80	0.89	5
14	0.99	0.99	0.99	869
15	0.80	0.36	0.50	11
17	0.75	1.00	0.86	3
19	0.62	0.83	0.71	6
20	0.80	1.00	0.89	4
21	0.98	1.00	0.99	47
23	0.00	0.00	0.00	0
24	0.82	0.93	0.87	15
25	0.00	0.00	0.00	0
accuracy			0.97	1147
macro avg	0.64	0.64	0.63	1147
weighted avg	0.98	0.97	0.97	1147

Extrator

```
Done  loading:  atis.train.pkl
      samples: 4978
   vocab_size:  943
   slot count:  129
 intent count:   26
Done  loading:  atis.test.pkl
      samples:  893
   vocab_size:  943
   slot count:  129
 intent count:   26
```

```
BATCH_SIZE = 64
EMBEDDING_DIM = 128
UNITS = 128
EPOCHS= 4
LABEL = len(i2l)+1
VOCABULARY = len(dicts['token_ids'])+1
INPUT_LENGTH = 42
INPUT_DIM = len(x_text)+1
OUTPUT_DIM=64
```

```
model = Sequential()
model.add(Embedding(input_dim=INPUT_DIM, output_dim=UNITS, input_length=INPUT_LENGTH))
model.add(Bidirectional(GRU(units=UNITS, return_sequences=True, dropout=0.3, recurrent_dropout=0.3), merge_mode = 'concat'))
model.add(GRU(units=UNITS, return_sequences=True, dropout=0.5, recurrent_dropout=0.5))
model.add(TimeDistributed(Dense(LABEL, activation="relu")))
model.summary()
model.compile(loss='categorical_crossentropy', optimizer='adam', metrics=['accuracy'])
```

	precision	recall	f1-score	support
0	0.00	0.00	0.00	22
1	0.02	1.00	0.04	1
2	0.00	0.00	0.00	0
3	0.06	1.00	0.11	1
4	0.00	0.00	0.00	0
5	0.33	0.75	0.46	8
6	0.04	0.25	0.07	4
7	0.00	0.00	0.00	0
8	0.00	0.00	0.00	0
9	0.13	0.92	0.22	12
10	0.10	1.00	0.19	18
11	0.16	0.65	0.25	17
12	0.00	0.00	0.00	0
13	0.02	1.00	0.05	1
14	0.00	0.00	0.00	0
15	0.00	0.00	0.00	0
16	0.22	1.00	0.36	22
17	0.00	0.00	0.00	0
18	0.29	0.50	0.36	4
19	0.17	0.82	0.28	17
20	0.02	1.00	0.04	1
21	0.00	0.00	0.00	0
22	0.00	0.00	0.00	0
23	0.23	0.76	0.36	25
24	0.00	0.00	0.00	0
25	0.54	0.62	0.58	76
26	0.17	0.93	0.29	15
27	0.00	0.00	0.00	0
28	0.00	0.00	0.00	0
29	0.00	0.00	0.00	0
30	0.00	0.00	0.00	0
31	0.27	0.88	0.41	49
32	0.04	1.00	0.07	1
33	0.14	1.00	0.25	12
34	0.00	0.00	0.00	0
35	0.47	0.94	0.62	507
36	0.00	0.00	0.00	0
37	0.00	0.00	0.00	0
38	0.08	1.00	0.15	12
39	0.50	0.87	0.64	136
40	0.34	0.93	0.50	28
41	0.00	0.00	0.00	0
42	0.26	1.00	0.42	15
43	0.99	0.77	0.87	10737
44	0.06	1.00	0.11	1
45	0.00	0.00	0.00	0
46	0.76	0.95	0.85	215
47	0.01	1.00	0.02	1
48	0.00	0.00	0.00	0
49	0.00	0.00	0.00	0
50	0.00	0.00	0.00	0
51	0.07	1.00	0.12	3
52	0.10	1.00	0.17	4
53	0.85	0.87	0.86	998
54	0.00	0.00	0.00	0
55	0.00	0.00	0.00	0
56	0.33	0.78	0.46	18
accuracy			0.79	12981
macro avg	0.14	0.48	0.18	12981
weighted avg	0.93	0.79	0.84	12981

Centro de Informática UFPE

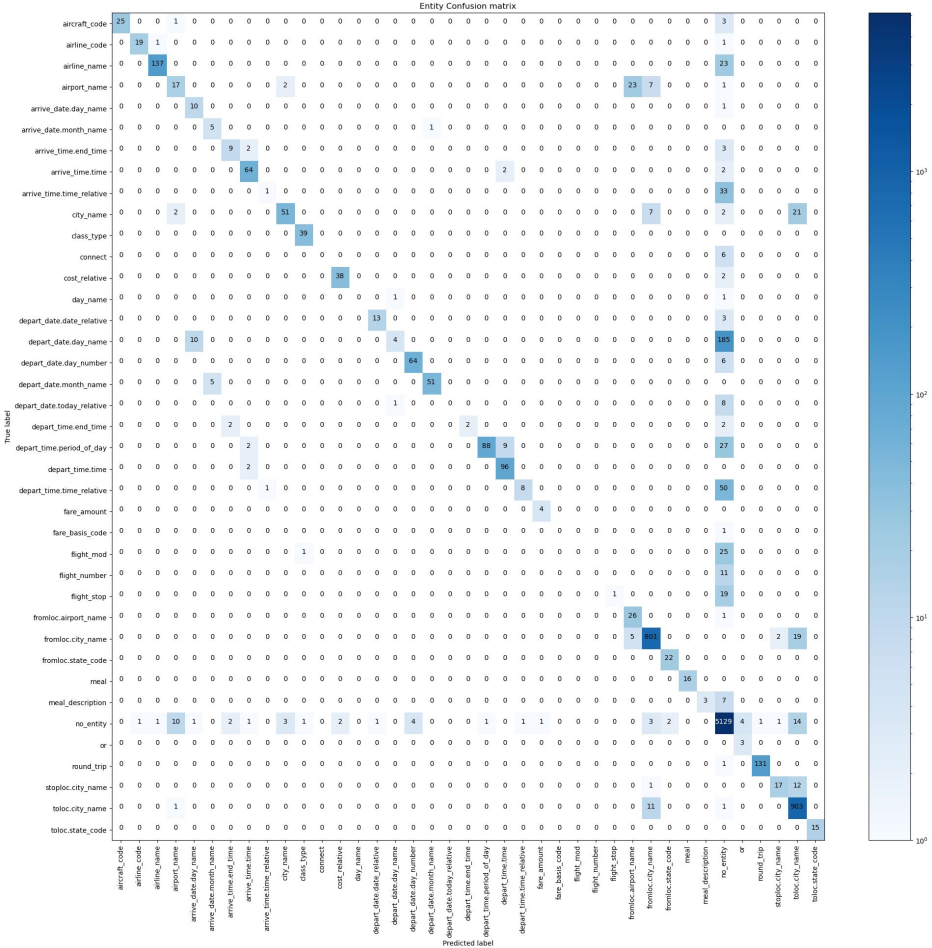
Universidade Federal de Pernambuco

A matriz de confusão é muito grande! Vamos ao GitHub

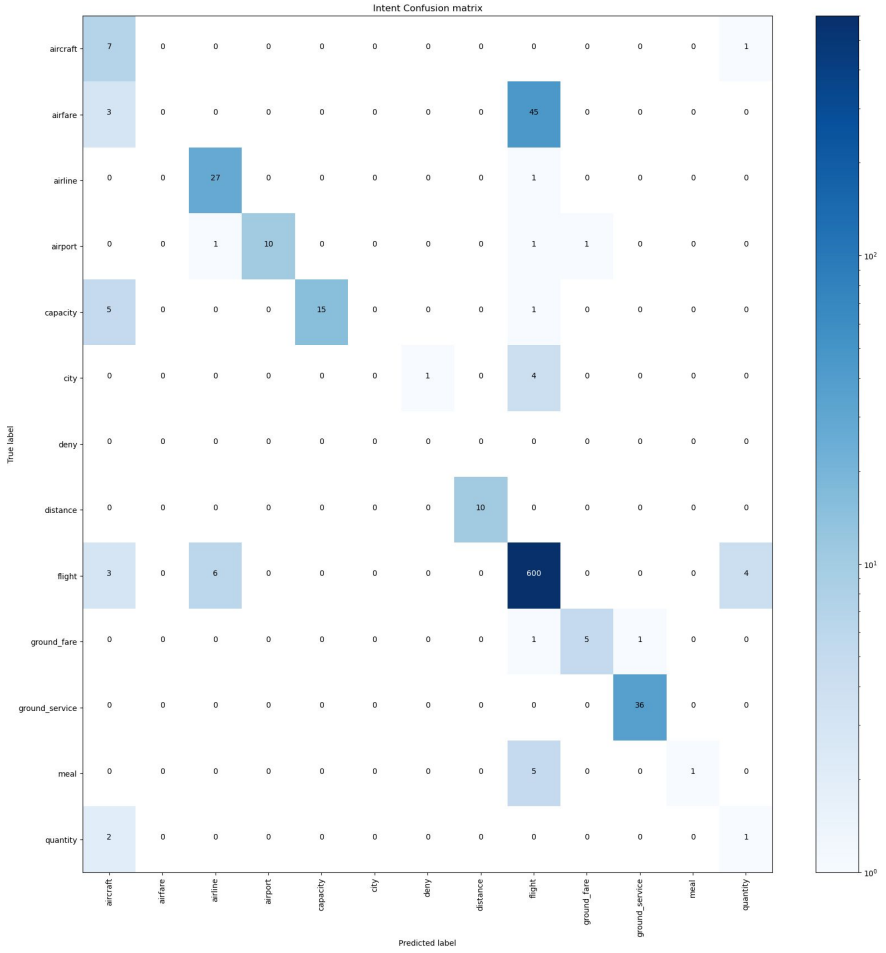
Chatbot com o Rasa

Classificador


```
"micro avg": {
    "precision": 0.927731673582296,
    "recall": 0.822501532801962,
    "f1-score": 0.8719532011699709,
    "support": 3262
},
"macro avg": {
    "precision": 0.7111569637312417,
    "recall": 0.618799018681978,
    "f1-score": 0.6118535524885375,
    "support": 3262
},
"weighted avg": {
    "precision": 0.897342279375854,
    "recall": 0.822501532801962,
    "f1-score": 0.8266082646461117,
    "support": 3262
}
```

Extrator


Intent Confusion matrix
True label
Predicted label
aircraft
airfare
airline
airport
capacity
city
deny
distance
flight
ground_fare
ground_service
meal
quantity
10^2
10^1
10^0

Stories

Temos apenas dois stories, pois o form permite captar vários slots em uma única chamada.

```
- story: principalVoo
  steps:
  - intent: flight
  - action: flight_form
  - active_loop: flight_form
  - active_loop: null
  - action: action_api_test
  - checkpoint: check_flow_finished
```

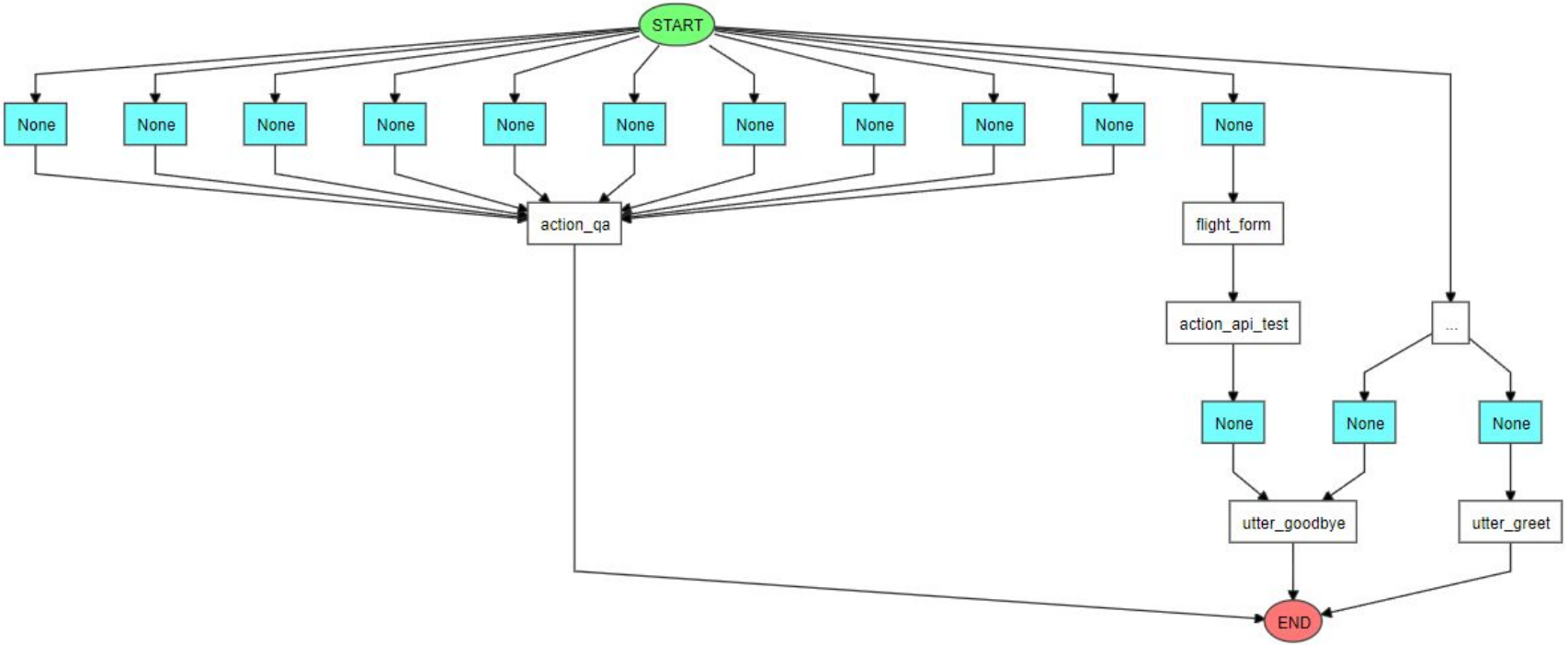
```
- story: finish flow
  steps:
  - checkpoint: check_flow_finished
  - intent: goodbye
  - action: utter_goodbye
```

```
forms:
  flight_form:
    required_slots:
      depart_date.day_number:
      - entity: depart_date.day_number
        type: from_entity
      depart_date.month_name:
      - entity: depart_date.month_name
        type: from_entity
      fromloc.city_name:
      - entity: fromloc.city_name
        type: from_entity
      toloc.city_name:
      - entity: toloc.city_name
        type: from_entity
```

Rules

```
- rule: Say goodbye anytime the user says goodbye
  steps:
  - intent: goodbye
  - action: utter_goodbye
```

```
- rule: Greet everytime the user greets
  steps:
  - intent: greet
  - action: utter_greet
```


START
None
None
None
None
None
None
None
None
None
None
None
action_qa
flight_form
action_api_test
...
None
None
None
utter_goodbye
utter_greet
END

Dialog-flow

Q&A

```
- story: mealComAirline
  steps:
  - intent: meal
    entities:
    - airline_name: ''
    - meal: ''
  - action: action_qa
```

```
- story: mealComCidades
  steps:
  - intent: meal
    entities:
    - fromloc.city_name: ''
    - toloc.city_name: ''
    - meal: ''
  - action: action_qa
```

```
- story: capacityComAirlineCode
  steps:
  - intent: capacity
    entities:
    - airline_code: ''
  - action: action_qa
```

```
- story: ground_serviceComFromLoc
  steps:
  - intent: ground_service
    entities:
    - fromloc.city_name: ''
  - action: action_qa
```

```
- story: airline
  steps:
  - intent: airline
    entities:
    - fromloc.city_name: ''
    - toloc.city_name: ''
  - action: action_qa
```

```
- story: ground_fareComCity
  steps:
  - intent: ground_fare
    entities:
    - city_name: ''
  - action: action_qa
```

```
- story: capacityComAirline
  steps:
  - intent: capacity
    entities:
    - airline_name: ''
  - action: action_qa
```

```
- story: ground_fareComAirportName
  steps:
  - intent: ground_fare
    entities:
    - fromloc.airport_name: ''
  - action: action_qa
```

```
- story: aircraft
  steps:
  - intent: aircraft
    entities:
    - fromloc.city_name: ''
    - toloc.city_name: ''
  - action: action_qa
```

```
- story: quantity
  steps:
  - intent: quantity
    entities:
    - fromloc.city_name: ''
    - toloc.city_name: ''
  - action: action_qa
```

```
- story: airport
  steps:
  - intent: airport
    entities:
    - city_name: ''
  - action: action_qa
```

```
- story: distance
  steps:
  - intent: distance
    entities:
    - fromloc.city_name: ''
    - toloc.city_name: ''
  - action: action_qa
```

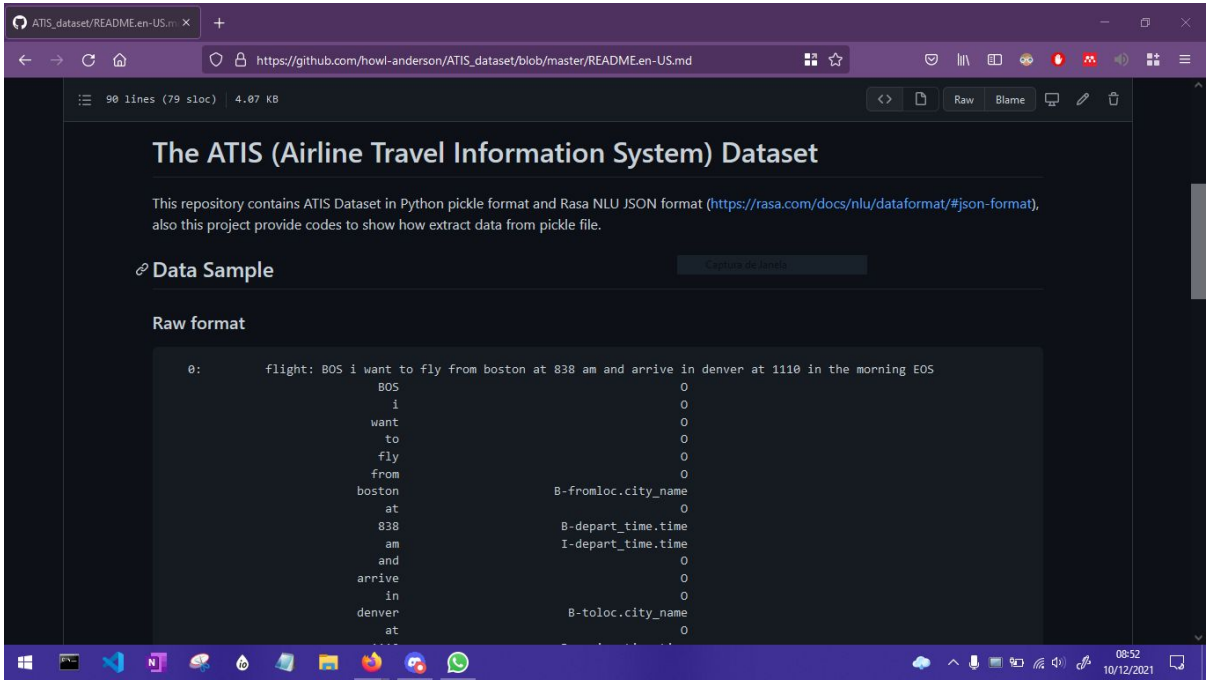
```
- story: ground_serviceComCity
  steps:
  - intent: ground_service
    entities:
    - city_name: ''
  - action: action_qa
```

```
- story: restriction
  steps:
  - intent: restriction
    entities:
    - fromloc.city_name: ''
    - toloc.city_name: ''
  - action: action_qa
```

Stories

Busca

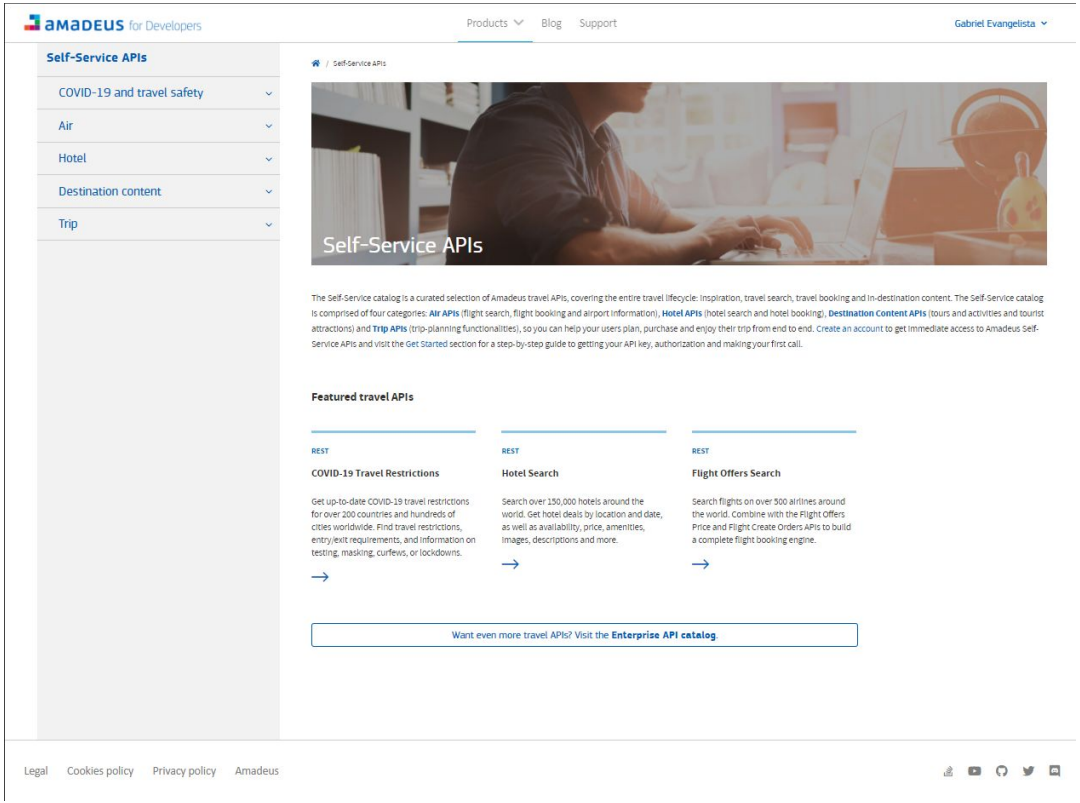
Dados usados



https://github.com/howl-anderson/ATIS_dataset

Ferramenta

- Amadeus API



https://developers.amadeus.com/

Integração

- Obtenção de Token
- Chamada para conversão de nome para IATA code
- Chamada final para obtenção dos voos entre as cidades e na data especificados

```
headers = {
    'Content-Type': 'application/x-www-form-urlencoded',
}

data = {
    'grant_type': 'client_credentials',
    'client_id': apiKey,
    'client_secret': apiSecret
}

response = requests.post('https://test.api.amadeus.com/v1/security/oauth2/token', headers=headers, data=data)
dicti = json.loads(response.text)
```

```
headers = {
    'Authorization': 'Bearer ' + dicti['access_token'],
}

params = (
    ('subType', 'CITY'),
    ('keyword', str(tracker.get_slot('fromloc.city_name'))),
)
response2 = requests.get('https://test.api.amadeus.com/v1/reference-data/locations', headers=headers, params=params)

fromCity = json.loads(response2.text)['data'][0]['iataCode']
```

```
params = (
    ('originLocationCode', str(fromCity)),
    ('destinationLocationCode', str(toCity)),
    ('departureDate', str(dataVoo.strftime('%Y-%m-%d'))),
    ('adults', 1),
)

response2 = requests.get('https://test.api.amadeus.com/v2/shopping/flight-offers', headers=headers, params=params)

dicti2 = json.loads(response2.text)
```