Stanza

Es un paquete de análisis de lenguaje natural de Python. Contiene herramientas, que se pueden usar en una tubería, para convertir una cadena de texto en lenguaje humano en listas de oraciones y palabras. Sirve para:

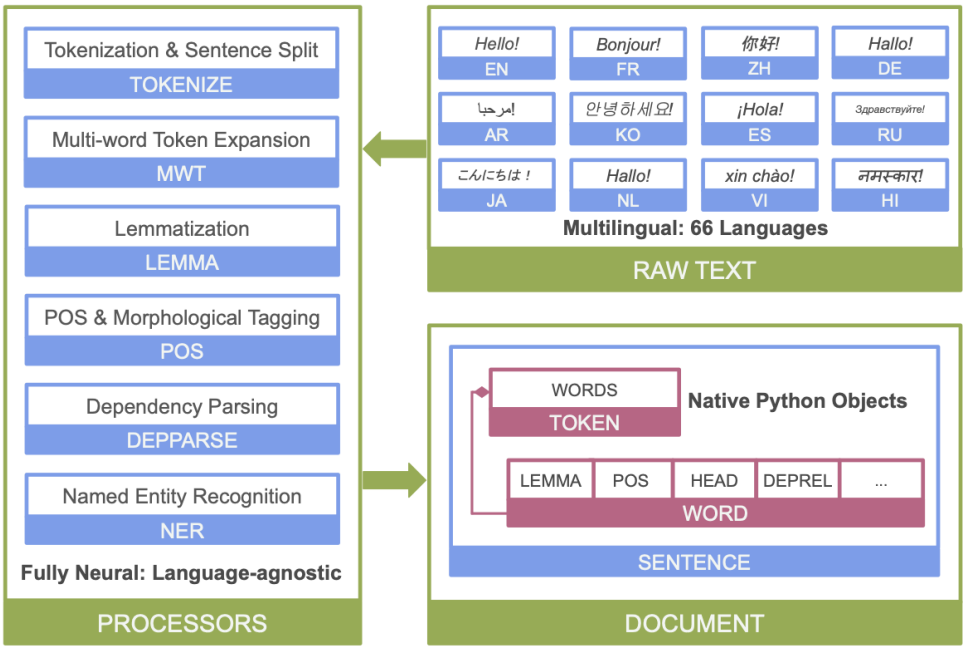
- Generar formas básicas de esas palabras
- Sus partes del discurso y características morfológicas
- Para dar un análisis de dependencia de estructura sintáctica
- Para reconocer entidades con nombre.

El kit de herramientas está diseñado para ser paralelo entre más de 70 idiomas, utilizando el *Universal Dependencies formalism.*

Características:

1. Implementación nativa de Python que requiere esfuerzos mínimos para configurar
2. Full neural network pipeline para análisis de texto robusto, que incluye tokenization, multi-word token (MWT) expansion, lemmatization, part-of-speech (POS) y morphological features tagging, dependency parsing y named entity recognition
3. Modelos neuronales entrenados que admiten 66 lenguajes (humanos);
4. Una interfaz Python estable y oficialmente mantenida para CoreNLP.

Descripción general de neural network NLP pipeline de Stanza:



INSTALACION DE STANZA

Para ello se usó del instalador de paquetes de python ‘pip’, ejecutando en el siguiente comando.

```
pip install stanza
```

EJECUCION DE STANZA

Una vez instalado Stanza se descargó el paquete de idioma en inglés y se ejecutó el primer pipeline para probar su correcta instalación. (El código es ejecutado sobre Anaconda).

```
In [4]: import stanza
        stanza.download('en') # download the english model
        nlp = stanza.Pipeline('en') # initialize English neural pipeline
        doc = nlp("Barack Obama was born in Hawaii.") # run annotation over a sentence
```

Debido a que ya se había descargado el paquete en ingles indicará que existía previamente.

```
Downloading https://raw.githubusercontent.com/stanfordnlp/stanza-resources/master/resources_1.0.0.json: 116kB [00:0
0, 1.76MB/s]
2020-04-28 12:59:12 INFO: Downloading default packages for language: en (English)...
2020-04-28 12:59:13 INFO: File exists: /home/javier/stanza_resources/en/default.zip.
2020-04-28 12:59:19 INFO: Finished downloading models and saved to /home/javier/stanza_resources.
2020-04-28 12:59:19 INFO: Loading these models for language: en (English):
========================
| Processor | Package   |
------------------------
| tokenize  | ewt       |
| pos       | ewt       |
| lemma     | ewt       |
| depparse  | ewt       |
| ner       | ontonotes |
========================

2020-04-28 12:59:19 INFO: Use device: cpu
2020-04-28 12:59:19 INFO: Loading: tokenize
2020-04-28 12:59:19 INFO: Loading: pos
2020-04-28 12:59:20 INFO: Loading: lemma
2020-04-28 12:59:20 INFO: Loading: depparse
2020-04-28 12:59:21 INFO: Loading: ner
2020-04-28 12:59:21 INFO: Done loading processors!
```

PROCCESORS

- Tokenization

```
import stanza

nlp = stanza.Pipeline(lang='en', processors='tokenize') # args: lang in english, processor to be used= Tokenizer
doc = nlp('Javier is excited to learn more about stanza')
for i, sentence in enumerate(doc.sentences):
    print(f'====== Sentence {i+1} tokens =======')
    print(*[f'id: {token.id}\ttext: {token.text}' for token in sentence.tokens], sep='\n')
```

```
2020-04-28 13:08:36 INFO: Loading these models for language: en (English):
=======================
| Processor | Package |
-----------------------
| tokenize  | ewt     |
=======================

2020-04-28 13:08:36 INFO: Use device: cpu
2020-04-28 13:08:36 INFO: Loading: tokenize
2020-04-28 13:08:36 INFO: Done loading processors!
```

```
====== Sentence 1 tokens =======
id: 1   text: Javier
id: 2   text: is
id: 3   text: excited
id: 4   text: to
id: 5   text: learn
id: 6   text: more
id: 7   text: about
id: 8   text: stanza
```

- Morphological features tagging

```
nlp = stanza.Pipeline(lang='en', processors='tokenize,mwt,pos') # applying tokenizer, POSprocessor and MWTpro..
##Running the POSProcessor requires the TokenizeProcessor and MWTProcessor.
doc = nlp('Javier is excited to learn more about stanza')
print(*[f'word: {word.text}\tupos: {word.upos}\txpos: {word.xpos}\tfeats: {word.feats if word.feats else "_"}'
       for sent in doc.sentences for word in sent.words], sep='\n')
```

```
2020-04-28 13:13:14 WARNING: Can not find mwt: default from official model list. Ignoring it.
2020-04-28 13:13:14 INFO: Loading these models for language: en (English):
=======================
| Processor | Package |
-----------------------
| tokenize  | ewt     |
| pos       | ewt     |
=======================

2020-04-28 13:13:14 INFO: Use device: cpu
2020-04-28 13:13:14 INFO: Loading: tokenize
2020-04-28 13:13:14 INFO: Loading: pos
2020-04-28 13:13:15 INFO: Done loading processors!
```

```
word: Javier    upos: PROPN     xpos: NNP       feats: Number=Sing
word: is        upos: AUX       xpos: VBZ       feats: Mood=Ind|Number=Sing|Person=3|Tense=Pres|VerbForm=Fin
word: excited   upos: ADJ       xpos: JJ        feats: Degree=Pos
word: to        upos: PART      xpos: TO        feats: _
word: learn     upos: VERB      xpos: VB        feats: VerbForm=Inf
word: more      upos: ADV       xpos: RBR       feats: _
word: about     upos: ADP       xpos: IN        feats: _
word: stanza    upos: NOUN      xpos: NN        feats: Number=Sing
```

Como podemos ver ha clasificado cada token de acuerdo a la nomenclatura EAGLES.

- Lemmatization

```
: nlp = stanza.Pipeline(lang='en', processors='tokenize,mwt,pos,lemma') #processors needed for lemmatization
  doc = nlp('Javier has been very excited for applying lemmatization')
  print(*[f'word: {word.text+" "}\tlemma: {word.lemma}' for sent in doc.sentences for word in sent.words], sep='\n')
```

```
2020-04-28 13:21:57 WARNING: Can not find mwt: default from official model list. Ignoring it.
2020-04-28 13:21:57 INFO: Loading these models for language: en (English):
=======================
| Processor | Package |
-----------------------
| tokenize  | ewt     |
| pos       | ewt     |
| lemma     | ewt     |
=======================

2020-04-28 13:21:57 INFO: Use device: cpu
2020-04-28 13:21:57 INFO: Loading: tokenize
2020-04-28 13:21:57 INFO: Loading: pos
2020-04-28 13:21:58 INFO: Loading: lemma
2020-04-28 13:21:58 INFO: Done loading processors!
```

```
word: Javier    lemma: Javier
word: has       lemma: have
word: been      lemma: be
word: very      lemma: very
word: excited   lemma: excited
word: for       lemma: for
word: applying  lemma: apply
word: lemmatization     lemma: lemmatization
```

- Dependency parsing

```
nlp = stanza.Pipeline(lang='en', processors='tokenize,mwt,pos,lemma,depparse')
doc = nlp('This processor creates a syntactic tree')
print(*[f'id: {word.id}\tword: {word.text}\thead id: {word.head}\thead: {sent.words[word.head-1].text if word.head >
       for sent in doc.sentences for word in sent.words], sep='\n')
```

```
id: 1   word: This      head id: 2      head: processor deprel: det
id: 2   word: processor head id: 3      head: creates   deprel: nsubj
id: 3   word: creates   head id: 0      head: root      deprel: root
id: 4   word: a head id: 6      head: tree      deprel: det
id: 5   word: syntactic head id: 6      head: tree      deprel: amod
id: 6   word: tree      head id: 3      head: creates   deprel: obj
```

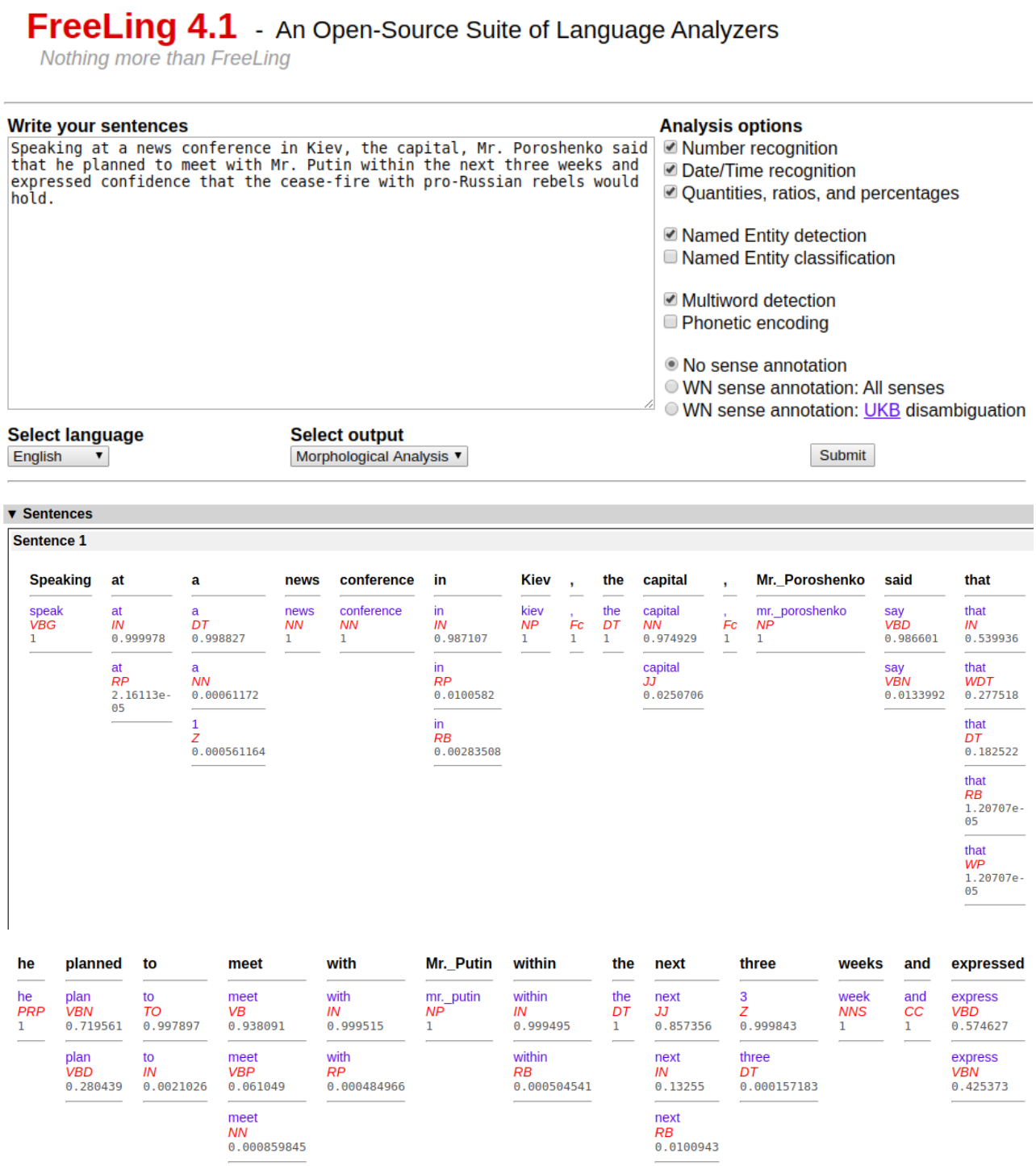
FREELING

FreeLing es una biblioteca de C ++ que proporciona funcionalidades de análisis de lenguaje (morphological analysis, named entity detection, PoS-tagging, parsing, Word Sense Disambiguation, Semantic Role Labelling, etc.) para una variedad de idiomas.

Su sitio web contiene una demo que permite interactuar con ella para realizar dichas tareas.

Como bien sabemos para la ejecución de ciertas tareas es necesario ejecutar tareas previas, el demo de Freeling no contiene la tarea de tokenization ni lemmatization por lo cual introduciremos todas juntas en el análisis morfológico.

- Tokenization, morphological analysis y lemmatization



Como podemos observar en la imagen anterior la demo tiene como salida el conjunto de tokens de color negro con su lemma de color azul (said -> say) y su información morfológica en formato EAGLE

- Full parsing y árbol sintáctico

Al ejecutar esta tarea en la demo arroja como resultado todos los procesamientos anteriores además de indicar el árbol sintáctico asociado a dicho texto.