tbi_extractor_example

October 15, 2020

1 Example for using TBI Extractor

1.0.1 1. Installation

[ ]:
```
# From the examples directory of tbiExtractor, install tbi-extractor
%pip install ../.
```

[2]:
```
# Imports
import datetime
import pandas as pd
from tbi_extractor import run_algorithm
```

1.0.2 2. tbiExtractor

[3]:
```
# Gather input radiology report
report_file = 'report_one.txt'
```

[4]:
```
# Show input
with open(report_file, 'r') as f:
    print(f.read())
```

```
Findings: There is hyperattenuation predominantly involving the right sylvian
fissure, left superior parietal sulci, right cingulate sulci and in the
quadrigeminal cistern. There is layering hyperattenuation within the occipital
horn of the left lateral ventricle. There is layering hyperattenuation in the
suprasellar cistern. Hyperattenuation is noted around the partially visualized
spinal cord. Foci of parenchymal hemorrhages are noted in the inferior right
temporal lobe, left frontal lobe and the right subthalamic nuclei. There is no
significant midline shift. The bony calvarium and the bones of the skull base
appear normal. The visualized portions of the paranasal sinuses and the mastoid
air cells are clear. No external soft tissue swelling. The orbits are
unremarkable. There is a small amount of fluid in the right sphenoid sinus.

Impression: 1. Multifocal subarachnoid hemorrhage as described above most
notably in the right sylvian fissure and left superior parietal lobe. Hemorrhage
is noted around the brainstem and cerebral convexities, right greater than left.
```

```
Additional layering hemorrhage is noted in the occipital horn of the left
lateral ventricle, suprasellar cistern and superior vermian cistern. 2.
Multifocal parenchymal hemorrhages, most notably in the right temporal lobe,
left frontal lobe, and right subthalamic nuclei. Findings are consistent with
severe shear injury.
```

[5]:
```
# Run tbiExtractor
df = run_algorithm.run(report_file)
```

[6]:
```
# Show output
df
```

[6]:

	target_group	modifier_group
0	aneurysm	absent
1	anoxic	absent
2	atrophy	absent
3	cistern	abnormal
4	contusion	absent
5	diffuse_axonal	present
6	epidural_hemorrhage	absent
7	facial_fracture	absent
8	fluid	present
9	gray_white_differentiation	normal
10	hemorrhage	absent
11	herniation	absent
12	hydrocephalus	absent
13	hyperdensities	present
14	hypodensities	absent
15	intracranial_pathology	present
16	intraparenchymal_hemorrage	present
17	intraventricular_hemorrhage	present
18	ischemia	absent
19	mass_effect	absent
20	microhemorrhage	absent
21	midline_shift	absent
22	pneumocephalus	absent
23	skull_fracture	absent
24	subarachnoid_hemorrhage	present
25	subdural_hemorrhage	absent
26	swelling	absent

[7]:
```
# Save output
get_today = datetime.date.today()
outfile = 'tbi_extractor_example_output_' + str(get_today) + '.csv'
df.to_csv(outfile, index=False)
```

1.0.3 3. Options: change the output format

`save_target_phrases` (`bool`): If True, save the lexical target phrases identified in the report for the resulting annotation. Default = False.

`save_modifier_phrases` (`bool`): If True, save the lexical modifier phrases identified in the report for the resulting annotation. Default = False.

[8]:
```
report_file = 'report_two.txt'
with open(report_file, 'r') as f:
    print(f.read())
```

```
Findings: There is no definite evidence of intracranial hemorrhage, mass effect,
midline shift or abnormal extraaxial fluid collection. There are numerous subtle
punctate hyperdense foci scattered throughout the brain. The ventricles do not
appear enlarged out of proportion to the cerebral sulci. Gray-white
differentiation subtle a slightly decreased. There is subtle diffuse swelling of
the brain. There are multiple skull base fractures and extensive facial
fractures which will be more completely detailed on the accompanying facial bone
CT reconstructions. There are mildly displaced bilateral frontal bone fractures
through the anterior table of the frontal sinuses and nondisplaced fracture of
the greater wing of the right sphenoid.. There are extensive sinus fractures
with near complete opacification of the maxillary sinuses, ethmoid air cells,
and sphenoid sinuses. There are a few scattered left ethmoid air cell opacities.
Right ethmoid air cells are relatively clear.. There are multiple foci of
subcutaneous emphysema and large dermal defects scattered throughout the frontal
scalp and the soft tissues of the face with soft tissue edema.

Impression: 1. No definite acute intracranial hemorrhage is identified. Several
punctate densities could possibly represent early signs of hemorrhage, perhaps
the earliest visual evidence for axonal injuries, but overall not definitive. 2.
Suspicion for diffuse subtle edema of the brain without loss of all gray-white
differentiation. This is a nonspecific finding that may represent the earliest
indication of diffuse edema from trauma or hypoxic ischemic encephalopathy, or
some combination HIE and traumatic edema. 3. Complex facial and skull base
fractures will be more completely detailed on the accompanying facial bones CT.
```

[9]:
```
df = run_algorithm.run(report_file,
                       save_target_phrases=True,
                       save_modifier_phrases=True)
df
```

[9]:

	target_phrase	target_group	\
0	aneurysm	aneurysm	
1	hypoxic	anoxic	
2	atrophy	atrophy	
3	cistern	cistern	

4	contusion	contusion
5	axonal	diffuse_axonal
6	epidural_hemorrhage	epidural_hemorrhage
7	fractures and extensive facial	facial_fracture
8	fluid	fluid
9	gray-white differentiation	gray_white_differentiation
10	intracranial hemorrhage	hemorrhage
11	herniation	herniation
12	hydrocephalus	hydrocephalus
13	hyperdense foci	hyperdensities
14	hypodensities	hypodensities
15	intracranial_pathology	intracranial_pathology
16	intraparenchymal_hemorrage	intraparenchymal_hemorrage
17	intraventricular_hemorrhage	intraventricular_hemorrhage
18	ischemia	ischemia
19	mass effect	mass_effect
20	microhemorrhage	microhemorrhage
21	midline shift	midline_shift
22	pneumocephalus	pneumocephalus
23	frontal bone fractures	skull_fracture
24	subarachnoid_hemorrhage	subarachnoid_hemorrhage
25	subdural_hemorrhage	subdural_hemorrhage
26	edema , edema., swelling	swelling

	modifier_phrase	modifier_group
0	default	absent
1	diffuse	present
2	default	absent
3	default	normal
4	default	absent
5	evidence	present
6	default	absent
7	multiple	present
8	default	absent
9	loss of	abnormal
10	no definite acute	absent
11	default	absent
12	default	absent
13	subtle	present
14	default	absent
15	default, is_intracranial_pathology	present
16	default	absent
17	default	absent
18	default	absent
19	no definite evidence of	absent
20	default	absent
21	no definite evidence of	absent

```
22                              default         absent
23                            displaced        present
24                              default         absent
25                              default         absent
26                 diffuse, some, subtle        present
```

1.0.4 4. Options: limit the lexical targets investigated

> Can only set to include or exclude lexical target options to limit the search. Defaults to standard target list.

`include_targets (list)`: A subset of the available lexical targets options to include. Default: None, resulting in standard target list output.

`exclude_targets (list)`: A subset of the available lexical targets options to exclude. Default: None, resulting in standard target list output.

[10]:
```
df = run_algorithm.run(report_file,
                       include_targets=['subdural_hemorrhage',
                                        'epidural_hemorrhage'])
df
```

[10]:
```
           target_group modifier_group
0  epidural_hemorrhage         absent
1  subdural_hemorrhage         absent
```

[11]:
```
df = run_algorithm.run(report_file,
                       exclude_targets=['atrophy',
                                        'aneurysm',
                                        'fluid'])
df
```

[11]:
```
                   target_group modifier_group
0                         anoxic        present
1                        cistern         normal
2                      contusion         absent
3                 diffuse_axonal        present
4            epidural_hemorrhage         absent
5                facial_fracture        present
6     gray_white_differentiation       abnormal
7                     hemorrhage         absent
8                     herniation         absent
9                   hydrocephalus         absent
10                hyperdensities        present
11                 hypodensities         absent
12        intracranial_pathology        present
13   intraparenchymal_hemorrage         absent
```

```
14  intraventricular_hemorrhage         absent
15                      ischemia         absent
16                   mass_effect         absent
17               microhemorrhage         absent
18                 midline_shift         absent
19               pneumocephalus         absent
20               skull_fracture        present
21      subarachnoid_hemorrhage         absent
22          subdural_hemorrhage         absent
23                      swelling        present
```