

## Homework 3

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**The Program**

This document is a **literate** Python program inset within a **L<sup>A</sup>T<sub>E</sub>X** document, woven and executed using **Pweave** and typeset using **pdfT<sub>E</sub>X**. This code is written in/for Python 3, and is intended for and tested under only **version 3.5.1**. It uses **nltk** to analyze corpora built using **Scrapy** (**≥1.1.0rc1**).<sup>1</sup>

Resolving the dependencies for this code is non-trivial. Ideally, pip should be able to handle the dependencies:

```

pip3 install \
    bs4 \
    nltk \
    scrapy==1.1.0rc1

```

However, if you are running OS X, pip will likely fail building lxml, since OS X does not ship libxml by default. This can usually be solved by (re)installing the Xcode command line tools: `xcode-select install`. However, this is not always successful. Additionally, if you have a Python distribution installed already, you may not want to attempt to alter it to accomodate this program, especially if you make use of a stable version of any of its dependencies.

In either case, the best solution is probably virtualization. The following Dockerfile is sufficient to create a suitable environment.<sup>2</sup>

```

FROM ubuntu
RUN apt-get update && \
    apt-get install -y \
        python3 \
        python3-pip

```

---

<sup>1</sup> Scrapy's stable release (**1.0.5**) does not support Python 3, so this program currently runs against only development versions after 1.1.0rc1. All code is tested to run against 1.1.0rc1 but is primarily run against 1.2.0dev2, the current development branch on github.

<sup>2</sup> Virtualenv is another good solution to avoid altering your Python installation, but cannot be used to satisfy the dependence on libxml, since it manages only Python-internal dependencies.

```
python3-bs4 \
python3-twisted-experimental \
python3-w3lib \
libxml2-dev \
libxslt1-dev \
libz-dev
RUN pip3 install scrapy==1.1.0rc1
```

This Dockerfile installs the following dependencies, against which the code has been tested to run on Ubuntu 14.04:

```
PAM==0.4.2
PyDispatcher==2.0.5
Scrapy==1.1.0rc1
Twisted==13.2.0
attrs==15.2.0
beautifulsoup4==4.2.1
chardet==2.2.1
colorama==0.2.5
cssselect==0.9.1
html5lib==0.999
lxml==3.3.3
parsel==1.0.1
pyOpenSSL==0.13
pyasn1==0.1.9
pyasn1-modules==0.0.8
pyserial==2.6
queuelib==1.4.2
requests==2.2.1
service-identity==16.0.0
six==1.5.2
```

```
urllib3==1.7.1
w3lib==1.14.2
wheel==0.24.0
zope.interface==4.0.5
```

### Building Corpora with **Scrapy**

Import stuff:

```
from scrapy import signals, Spider, Item, Field, Request
from scrapy.crawler import Crawler
from scrapy.exporters import XmlItemExporter, JsonLinesItemExporter
from scrapy.loader import ItemLoader
from scrapy.loader.processors import Join, MapCompose, TakeFirst
from scrapy.settings import Settings
from scrapy.utils import log
from twisted.internet import reactor

from bs4 import BeautifulSoup
from w3lib.html import remove_tags
import re
```

Scrapy provides an **Item** class which is used to collect scraped data. The following code defines an **Item** class to hold information about stories. Each chapter of each story in the corpus will be stored as a separate text (body) with a title, an author, a description or summary (desc), the topic or theme of the story, its page or chapter number within a larger work, the site it was scraped from, and the url from which it was scraped.

```
class StoryItem(Item):
    title = Field()
    author = Field()
    desc = Field()
    body = Field()
    url = Field()
```

```

site    = Field()
theme   = Field()
page    = Field()

```

Define how to load the above item with raw data from the sites.

```

class StoryItemLoader(ItemLoader):
    default_input_processor = MapCompose(str.strip)
    default_output_processor = TakeFirst()

    body_in = MapCompose(remove_tags)
    body_out = Join()

```

```

class FFItemLoader(StoryItemLoader):
    # desc_out = Join()
    desc_in = MapCompose(remove_tags)
    desc_out = Join()

```

```

class AOItemLoader(StoryItemLoader):
    body_out = Join()
    theme_out = Join(' ', ' ')

```

Pipe the scraped text into Json items on the lines of a file (one file per spider).

```

class JsonLinesExportPipeline(object):
    def __init__(self):
        self.files = {}

    @classmethod
    def from_crawler(cls, crawler):
        pipeline = cls()
        crawler.signals.connect(pipeline.spider_opened,
                                signals.spider_opened)
        crawler.signals.connect(pipeline.spider_closed,

```

```
signals.spider_closed)

    return pipeline

def spider_opened(self, spider):
    file = open('%s_products.json' % spider.name, 'w+b')
    self.files[spider] = file
    self.exporter = JsonLinesItemExporter(file)
    self.exporter.start_exporting()

def spider_closed(self, spider):
    self.exporter.finish_exporting()
    file = self.files.pop(spider)
    file.close()

def process_item(self, item, spider):
    self.exporter.export_item(item)
    return item
```

A spider to scrape [fanfiction.net](http://fanfiction.net):

```
class FFSpider(Spider):
    name = "ff"
    allowed_domains = ["fanfiction.net"]
    start_urls = [
        "https://www.fanfiction.net/%s/" % c for c in
        (
            'anime',
            'book',
            'cartoon',
            'comic',
            'game',
            'misc',
            'movie',
        )
    ]
```

```

        'play',
        'tv'
    )
]

def parse(self, response):
    for href in response.xpath('//td[@valign="TOP"]/div/a/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback = self.parse_tag)

def parse_tag(self, response):
    for href in response.xpath('//div/center[1]/a[contains(text(),
"Next")]/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback = self.parse_tag)

    for href in
response.xpath('//div[contains(@class,"z-list")]a[1]/@href'):
        long_url = response.urljoin(href.extract())
        url      = '//'.join(long_url.split('//')[0:-1])
        yield Request(url, callback = self.parse_story)

def parse_story(self, response):
    header = response.xpath('//span[@class="xgray
xcontrast_txt"]/text()')
    head   = header.extract()[1]
    chapter = int(response.url.split('/')[-1])
    more    = re.search('Chapters: [0-9]*', head)
    if more and chapter == 1:
        chapters = int(more.group(0).split()[1])
        base_url = '//'.join(response.url.split('//')[0:-1])
        urls = [

```

```

        base_url + '/' + str(x) for x in range(2, chapters+1)
    ]
    for url in urls:
        yield Request(url, callback = self.parse_story)

    loader = FFItemLoader(StoryItem(), response=response)
    loader.add_xpath('title', '//*[@id="profile_top"]/b/text()')
    loader.add_xpath('author',
        '//*[@id="profile_top"]/a[1]/text()')
    loader.add_xpath('desc', '//*[@id="profile_top"]/div')
    loader.add_xpath('body', '//*[@id="storytext"]')
    loader.add_value('url', response.url)
    loader.add_value('site', 'fanfiction.net')
    loader.add_value('theme', '')
    loader.add_value('page', str(chapter))
    yield loader.load_item()

```

Spider for **Literotica**:

```

class LSpider(Spider):
    name = "le"
    allowed_domains = ["literotica.com"]
    start_urls = [
        "https://www.literotica.com/c/%s/1-page" % c for c in
        (
            'adult-how-to',
            'adult-humor',
            'adult-romance',
            'anal-sex-stories',
            'bdsm-stories',
            'bdsm-stories',
            'celebrity-stories',
            'chain-stories',

```



```
        'erotic-couplings',
        'erotic-horror',
        'erotic-letters',
        'erotic-novels',
        'erotic-poetry',
        'exhibitionist-voyeur',
        'fetish-stories',
        'first-time-sex-stories',
        'gay-sex-stories',
        'group-sex-stories',
        'illustrated-erotic-fiction',
        'interracial-erotic-fiction',
        'lesbian-sex-stories',
        'loving-wives',
        'masturbation-stories',
        'mature-sex',
        'mind-control',
        'non-consent-stories',
        'non-erotic-poetry',
        'non-erotic-stories',
        'non-human-stories',
        'reviews-and-essays',
        'science-fiction-fantasy',
        'taboo-sex-stories',
        'transsexuals-crossdressers'
    )
]

def parse(self, response):
    for href in
response.xpath('//*[@id="content"]/div/div/h3/a/@href'):
    url = response.urljoin(href.extract())
```

```

        yield Request(url, callback=self.parse_story)
    for href in response.xpath('//*[@class="b-pager-
next"]/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback=self.parse)

    def parse_story(self, response):
        loader = StoryItemLoader(StoryItem(), response=response)
        loader.add_xpath('title', '//h1/text()')
        loader.add_xpath('author',
        '//*[@id="content"]/div[2]/span[1]/a/text()')
        loader.add_value('desc', '')
        loader.add_xpath('theme',
        ('//*[@id="content"]/div[1]/a/text()'))
        loader.add_xpath('body', '//*[@id="content"]/div[3]/div')
        loader.add_value('url', response.url)
        loader.add_value('site', 'literotica.com')
        loader.add_xpath('page', '//*[@class="b-pager-
active"]/text()')
        yield loader.load_item()

    for href in response.xpath('//*[@class="b-pager-
next"]/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback=self.parse_story)

```

Spider for AO3:

```

class AOSpider(Spider):
    name = "ao"
    allowed_domains = ["archiveofourown.org"]
    start_urls = [
        "https://archiveofourown.org/media"
    ]

```

```

]

def parse(self, response):
    for href in response.xpath('//h3/a/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback=self.parse_genre)

def parse_genre(self, response):
    for href in response.xpath('//li/ul/li/a/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback=self.parse_tag)

def parse_tag(self, response):
    for href in
response.xpath('(//ol[@role="navigation"])[1]/li[last()]/a/@href'):
        url = response.urljoin(href.extract())
        yield Request(url, callback=self.parse_tag)

    for href in response.xpath('//h4/a[1]/@href'):
        url = response.urljoin(href.extract()) +
'?view_full_work=true&view_adult=true'
        yield Request(url, callback=self.parse_story)

def parse_story(self, response):
    loader = AOItemLoader(StoryItem(), response=response)
    loader.add_xpath('title', '//h2/text()')
    loader.add_xpath('author', '//a[@rel="author"]/text()')
    loader.add_xpath('desc', '//*[@class="summary
module"])[1]//p/text()')
    loader.add_xpath('body', '//*[@id="chapters"]//div/p/text()')
    loader.add_value('url', response.url)

```

```

        loader.add_value('site', 'archiveofourown.org')
        loader.add_xpath('theme', '//dd[@class="fandom
tags"]//a/text()')
    yield loader.load_item()

```

I haven't yet figured out what signal the spiders should send to avoid shutting down the reactor (which cannot be restarted) before all three are finished (if they are all run together).

```

# callback fired when the spider is closed
def callback(spider, reason):
    stats = spider.crawler.stats.get_stats() # collect/log stats?

    # stop the reactor
    reactor.stop()

# instantiate settings and provide a custom configuration
settings = Settings()
settings.set(
    'ITEM_PIPELINES', {
        '__main__.JsonLinesExportPipeline': 100,
    }
)
settings.set(
    'USER_AGENT', 'Mozilla/5.0 (Windows NT 6.3; Win64; x64)'
)

# instantiate a spider
ff_spider = FFSpider()
le_spider = LESpider()
ao_spider = AOSpider()

# instantiate a crawler passing in settings
# crawler = Crawler(settings)
ff_crawler = Crawler(ff_spider, settings)

```

```
le_crawler = Crawler(le_spider, settings)
ao_crawler = Crawler(ao_spider, settings)
# configure signals
ff_crawler.signals.connect(callback, signal=signals.spider_closed)
le_crawler.signals.connect(callback, signal=signals.spider_closed)
ao_crawler.signals.connect(callback, signal=signals.spider_closed)

# configure and start the crawler
# crawler.configure()
# crawler.crawl(spider)
ff_crawler.crawl()
# le_crawler.crawl()
# ao_crawler.crawl()

# start logging
# log.start()
log.configure_logging()

# start the reactor (blocks execution)
reactor.run()
```

**Analysis with NLTK**