Ida Documentation

Ida Developers

Sep 09, 2018

Contents

lda implements latent Dirichlet allocation (LDA) using collapsed Gibbs sampling. lda is fast and can be installed without a compiler on Linux, OS X, and Windows.

The interface follows conventions found in scikit-learn. The following demonstrates how to inspect a model of a subset of the Reuters news dataset. (The input below, `X`, is a document-term matrix.)

```
>>> import numpy as np
>>> import lda
>>> X = lda.datasets.load_reuters()
>>> vocab = lda.datasets.load_reuters_vocab()
>>> titles = lda.datasets.load_reuters_titles()
>>> X.shape
(395, 4258)
>>> X.sum()
84010
>>> model = lda.LDA(n_topics=20, n_iter=1500, random_state=1)
>>> model.fit(X)  # model.fit_transform(X) is also available
>>> topic_word = model.topic_word_  # model.components_ also works
>>> n_top_words = 8
>>> for i, topic_dist in enumerate(topic_word):
...     topic_words = np.array(vocab)[np.argsort(topic_dist)][:-n_top_words:-1]
...     print('Topic {}: {}'.format(i, ' '.join(topic_words)))
Topic 0: british churchill sale million major letters west
Topic 1: church government political country state people party
Topic 2: elvis king fans presley life concert young
Topic 3: yeltsin russian russia president kremlin moscow michael
Topic 4: pope vatican paul john surgery hospital pontiff
Topic 5: family funeral police miami versace cunanan city
Topic 6: simpson former years court president wife south
Topic 7: order mother successor election nuns church nirmala
Topic 8: charles prince diana royal king queen parker
Topic 9: film french france against bardot paris poster
Topic 10: germany german war nazi letter christian book
Topic 11: east peace prize award timor quebec belo
Topic 12: n't life show told very love television
Topic 13: years year time last church world people
Topic 14: mother teresa heart calcutta charity nun hospital
Topic 15: city salonika capital buddhist cultural vietnam byzantine
Topic 16: music tour opera singer israel people film
Topic 17: church catholic bernardin cardinal bishop wright death
Topic 18: harriman clinton u.s ambassador paris president churchill
Topic 19: city museum art exhibition century million churches
```

Contents:

CHAPTER 1

Getting started

The following demonstrates how to inspect a model of a subset of the Reuters news dataset. The input below, `X`, is a document-term matrix (sparse matrices are accepted).

```
>>> import numpy as np
>>> import lda
>>> X = lda.datasets.load_reuters()
>>> vocab = lda.datasets.load_reuters_vocab()
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Topic 12: n't life show told very love television
Topic 13: years year time last church world people
Topic 14: mother teresa heart calcutta charity nun hospital
```

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```
Topic 15: city salonika capital buddhist cultural vietnam byzantine
Topic 16: music tour opera singer israel people film
Topic 17: church catholic bernardin cardinal bishop wright death
Topic 18: harriman clinton u.s ambassador paris president churchill
Topic 19: city museum art exhibition century million churches
```

The document-topic distributions are available in `model.doc_topic_`.

```
>>> doc_topic = model.doc_topic_
>>> for i in range(10):
...     print("{} (top topic: {})".format(titles[i], doc_topic[i].argmax()))
0 UK: Prince Charles spearheads British royal revolution. LONDON 1996-08-20 (top␣
↪topic: 8)
1 GERMANY: Historic Dresden church rising from WW2 ashes. DRESDEN, Germany 1996-08-21␣
↪(top topic: 13)
2 INDIA: Mother Teresa's condition said still unstable. CALCUTTA 1996-08-23 (top␣
↪topic: 14)
3 UK: Palace warns British weekly over Charles pictures. LONDON 1996-08-25 (top␣
↪topic: 8)
4 INDIA: Mother Teresa, slightly stronger, blesses nuns. CALCUTTA 1996-08-25 (top␣
↪topic: 14)
5 INDIA: Mother Teresa's condition unchanged, thousands pray. CALCUTTA 1996-08-25␣
↪(top topic: 14)
6 INDIA: Mother Teresa shows signs of strength, blesses nuns. CALCUTTA 1996-08-26␣
↪(top topic: 14)
7 INDIA: Mother Teresa's condition improves, many pray. CALCUTTA, India 1996-08-25␣
↪(top topic: 14)
8 INDIA: Mother Teresa improves, nuns pray for "miracle". CALCUTTA 1996-08-26 (top␣
↪topic: 14)
9 UK: Charles under fire over prospect of Queen Camilla. LONDON 1996-08-26 (top␣
↪topic: 8)
```

Document-topic distributions may be inferred for out-of-sample texts using the `transform` method:

```
>>> X = lda.datasets.load_reuters()
>>> titles = lda.datasets.load_reuters_titles()
>>> X_train = X[10:]
>>> X_test = X[:10]
>>> titles_test = titles[:10]
>>> model = lda.LDA(n_topics=20, n_iter=1500, random_state=1)
>>> model.fit(X_train)
>>> doc_topic_test = model.transform(X_test)
>>> for title, topics in zip(titles_test, doc_topic_test):
...     print("{} (top topic: {})".format(title, topics.argmax()))
0 UK: Prince Charles spearheads British royal revolution. LONDON 1996-08-20 (top␣
↪topic: 7)
1 GERMANY: Historic Dresden church rising from WW2 ashes. DRESDEN, Germany 1996-08-21␣
↪(top topic: 11)
2 INDIA: Mother Teresa's condition said still unstable. CALCUTTA 1996-08-23 (top␣
↪topic: 4)
3 UK: Palace warns British weekly over Charles pictures. LONDON 1996-08-25 (top␣
↪topic: 7)
4 INDIA: Mother Teresa, slightly stronger, blesses nuns. CALCUTTA 1996-08-25 (top␣
↪topic: 4)
5 INDIA: Mother Teresa's condition unchanged, thousands pray. CALCUTTA 1996-08-25␣
↪(top topic: 4)
6 INDIA: Mother Teresa shows signs of strength, blesses nuns. CALCUTTA 1996-08-26␣
↪(top topic: 4)
```

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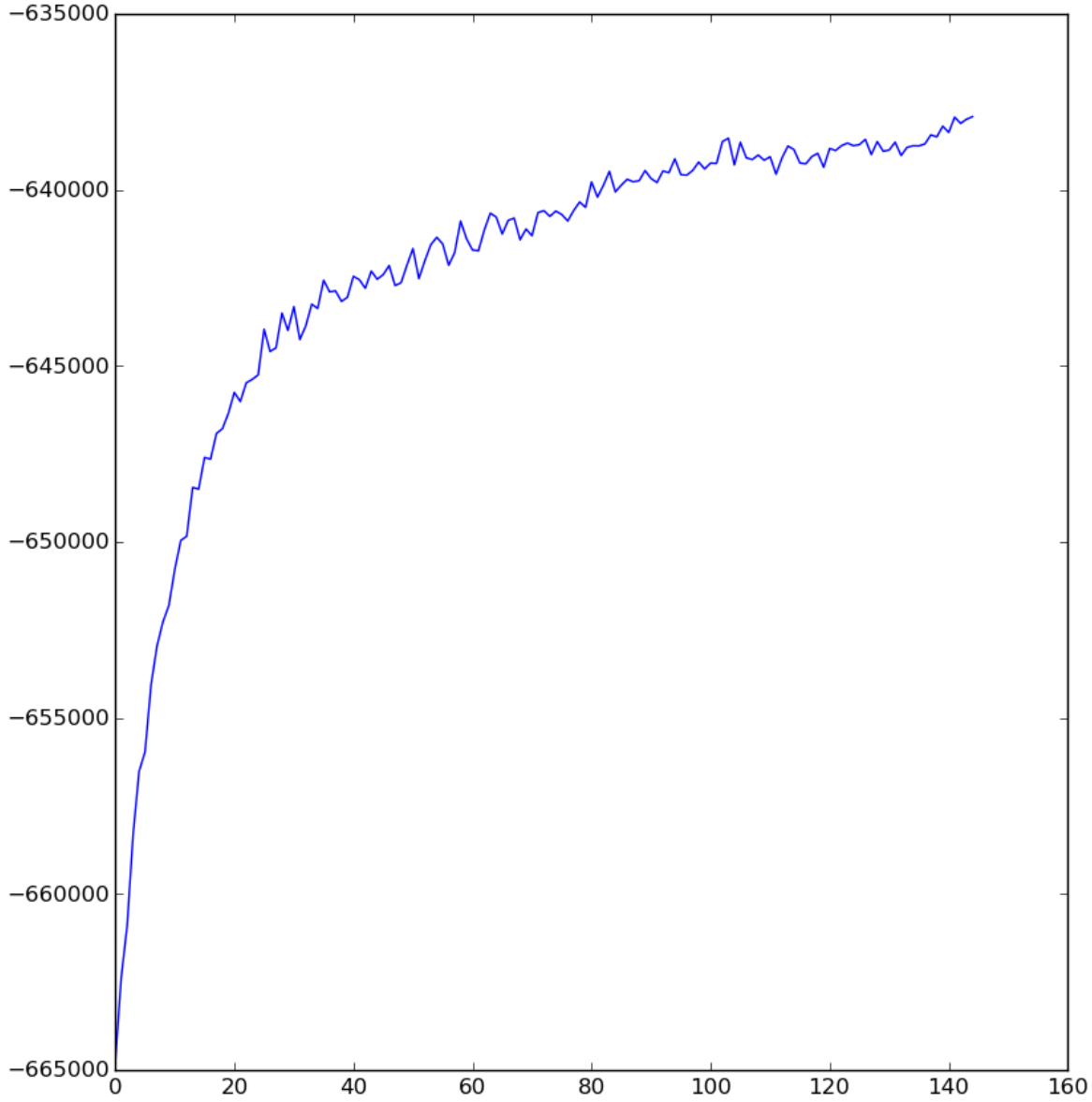
```
7 INDIA: Mother Teresa's condition improves, many pray. CALCUTTA, India 1996-08-25␣
↪(top topic: 4)
8 INDIA: Mother Teresa improves, nuns pray for "miracle". CALCUTTA 1996-08-26 (top␣
↪topic: 4)
9 UK: Charles under fire over prospect of Queen Camilla. LONDON 1996-08-26 (top␣
↪topic: 11)
```

(Note that the topic numbers have changed due to LDA not being an identifiable model. The phenomenon is known as label switching in the literature.)

Convergence may be monitored by accessing the `loglikelihoods_` attribute on a fitted model. The attribute is bound to a list which records the sequence of log likelihoods associated with the model at different iterations (thinned by the `refresh` parameter).

(The following code assumes matplotlib is installed.)

```
>>> import matplotlib.pyplot as plt
>>> # skipping the first few entries makes the graph more readable
>>> plt.plot(model.loglikelihoods_[5:])
```



Judging convergence from the plot, the model should be fit with a slightly greater number of iterations.

CHAPTER 2

Installing lda

lda requires Python (>= 2.7 or >= 3.3) and NumPy (>= 1.13.0). If these requirements are satisfied, lda should install successfully with:

```
pip install lda
```

If you encounter problems, consult the platform-specific instructions below.

2.1 Windows

lda and its dependencies are all available as wheel packages for Windows:

```
pip install lda
```

2.2 Mac OS X

lda and its dependencies are all available as wheel packages for Mac OS X:

```
pip install lda
```

2.3 Linux

lda and its dependencies are all available as wheel packages for most distributions of Linux:

```
pip install lda
```

2.4 Installation from source

Installing from source requires you to have installed the Python development headers and a working C/C++ compiler. Under Debian-based operating systems, which include Ubuntu, you can install all these requirements by issuing:

```
sudo apt-get install build-essential python3-dev python3-setuptools \
                     python3-numpy
```

Before attempting a command such as `python setup.py install` you will need to run Cython to generate the relevant C files:

```
make cython
```

CHAPTER 3

API

3.1 lda.lda

3.2 lda.utils

CHAPTER 4

Contributing

CHAPTER 5

Style Guidlines

Before contributing a patch, please read the Python "Style Commandments" written by the OpenStack developers: http://docs.openstack.org/developer/hacking/

CHAPTER 6

Building in Develop Mode

To build in develop mode on OS X, first install Cython and pbr. Then run:

```
git clone https://github.com/lda-project/lda.git
cd lda
make cython
python setup.py develop
```

CHAPTER 7

Groups

The `lda-users` group is for general discussion of lda, including modeling and installation issues:

- lda users group

You can subscribe by sending an e-mail to `lda-users+subscribe@googlegroups.com`.

CHAPTER 8

What's New

8.1 v1.1.0 (9. September 2018)

- Wheels for Python 3.7
- Minimum required NumPy version is 1.13.0.
- Major speed increase in data loading. Thanks @luoshao23.
- Bugfix in Cython searchsorted function. Thanks @luoshao23.

8.2 v1.0.5 (18. June 2017)

- Wheels for Python 3.6

8.3 v1.0.4 (13. July 2016)

- Linux wheels (manylinux1)

8.4 v1.0.3 (5. Nov 2015)

- Python 3.5 wheels
- Release GIL during sampling
- Many minor fixes

CHAPTER 9

Indices and tables

- genindex
- modindex
- search