<https://stegano.readthedocs.io/en/latest/software/>

[Stegano](https://github.com/cedricbonhomme/Stegano)是一个纯Python [隐写](http://en.wikipedia.org/wiki/Steganography)模块。

隐写术是一种以隐藏方式编写隐藏消息的艺术和科学，除了发送者和预期的接收者之外，没有人怀疑消息的存在，这是一种通过隐蔽的安全方式。因此，Stéganô提供的功能仅隐藏消息，而不进行加密。密码术通常与密码术一起使用。

Stéganô实现了以下隐藏方法：

* 使用像素的红色部分隐藏ASCII消息；
* 使用[最低有效位](http://en.wikipedia.org/wiki/Least_significant_bit)（LSB）技术；
* 将LSB技术与基于生成器的集合一起使用（用于Eratosthenes的筛网，Fermat，Mersenne数等）；
* 使用图像的描述字段（JPEG和TIFF）。

此外，提供了一些[隐写分析](http://en.wikipedia.org/wiki/Steganalysis)方法：

* 隐式分析彩色图像中的LSB编码；
* 统计隐写分析。

您也可以通过此[Web服务](https://stegano-web.herokuapp.com/)使用Stegano 。并非Stegano的所有功能都涵盖在内。

**Requirements**

* [Python](https://www.python.org/) 3;
* [Pillow](https://pypi.python.org/pypi/Pillow);
* [piexif](https://pypi.python.org/pypi/piexif).

# Turorial

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* [隐写分析](https://stegano.readthedocs.io/en/latest/steganalysis/)
  + [平价](https://stegano.readthedocs.io/en/latest/steganalysis/#parity)

# 安装

$ pipenv install Stegano

您将能够在Python程序中或将Stéganô用作命令行工具。

如果要检索源代码（使用单元测试）：

$ git clone https://github.com/cedricbonhomme/Stegano.git

# 使用Stéganô作为Python模块

您可以在[单元测试目录中](https://github.com/cedricbonhomme/Stegano/tree/master/tests)找到更多示例 。

## LSB方法

Python 3.5.1 (default, Dec 7 2015, 11:33:57)

[GCC 4.9.2] on linux

Type "help", "copyright", "credits" or "license" for more information.

>>> from stegano import lsb

>>> secret = lsb.hide("./tests/sample-files/Lenna.png", "Hello world!")

>>> secret.save("./Lenna-secret.png")

>>> print(lsb.reveal("./Lenna-secret.png"))

Hello world!

## 带集合的LSB方法

使用集是为了选择将隐藏消息的像素。

Python 3.5.1 (default, Dec 7 2015, 11:33:57)

[GCC 4.9.2] on linux

Type "help", "copyright", "credits" **or** "license" **for** more information.

>>> **from** **stegano** **import** lsbset

>>> **from** **stegano.lsbset** **import** generators

*# Hide a secret with the Sieve of Eratosthenes*

>>> secret\_message = "Hello World!"

>>> secret\_image = lsbset.hide("./tests/sample-files/Lenna.png",

secret\_message,

generators.eratosthenes())

>>> secret\_image.save("./image.png")

*# Try to decode with another generator*

>>> message = lsbset.reveal("./image.png", generators.fibonacci())

Traceback (most recent call last):

File "<stdin>", line 1, **in** <module>

File "/home/cedric/projects/Stegano/stegano/lsbset/lsbset.py", line 111, **in** reveal

**for** color **in** img\_list[generated\_number]:

IndexError: list index out of range

*# Decode with Eratosthenes*

>>> message = lsbset.reveal("./image.png", generators.eratosthenes())

>>> message

'Hello World!'

>>> *# Generators available*

>>> **import** **inspect**

>>> all\_generators = inspect.getmembers(generators, inspect.isfunction)

>>> **for** generator **in** all\_generators:

... **print**(generator[0], generator[1].\_\_doc\_\_)

...

Dead\_Man\_Walking None

OEIS\_A000217

http://oeis.org/A000217

Triangular numbers: a(n) = C(n+1,2) = n(n+1)/2 = 0+1+2+...+n.

ackermann

Ackermann number.

carmichael None

eratosthenes

Generate the prime numbers **with** the sieve of Eratosthenes.

eratosthenes\_composite

Generate the composite numbers **with** the sieve of Eratosthenes.

fermat

Generate the n-th Fermat Number.

fibonacci

A generator **for** Fibonacci numbers, goes to next number **in** series on each call.

This generator start at 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, 2584, 4181, 6765, 10946, ...

See: http://oeis.org/A000045

identity

f(x) = x

log\_gen

Logarithmic generator.

mersenne

Generate 2^n-1.

syracuse

Generate the sequence of Syracuse.

## 图像的说明字段

对于JPEG和TIFF图像。

Python 3.5.1 (default, Dec 7 2015, 11:33:57)

[GCC 4.9.2] on linux

Type "help", "copyright", "credits" **or** "license" **for** more information.

>>> **from** **stegano** **import** exifHeader

>>> secret = exifHeader.hide("./tests/sample-files/20160505T130442.jpg",

"./image.jpg", secret\_message="Hello world!")

>>> **print**(exifHeader.reveal("./image.jpg"))

# 在命令行中使用Stéganô

**命令stegano-lsb**

使用LSB方法隐藏和显示消息。

**显示帮助**

$ stegano-lsb --help

usage: stegano-lsb [-h] {hide,reveal} ...

positional arguments:

{hide,reveal} sub-command help

hide hide help

reveal reveal help

optional arguments:

-h, --help show this help message and exit

$ stegano-lsb hide --help

usage: stegano-lsb hide [-h] -i INPUT\_IMAGE\_FILE [-e {UTF-8,UTF-32LE}]

(-m SECRET\_MESSAGE | -f SECRET\_FILE) -o

OUTPUT\_IMAGE\_FILE

optional arguments:

-h, --help show this help message and exit

-i INPUT\_IMAGE\_FILE, --input INPUT\_IMAGE\_FILE

Input image file.

-e {UTF-8,UTF-32LE}, --encoding {UTF-8,UTF-32LE}

Specify the encoding of the message to hide. UTF-8

(default) or UTF-32LE.

-m SECRET\_MESSAGE Your secret message to hide (non binary).

-f SECRET\_FILE Your secret to hide (Text or any binary file).

-o OUTPUT\_IMAGE\_FILE, --output OUTPUT\_IMAGE\_FILE

Output image containing the secret.

$ stegano-lsb reveal --help

usage: stegano-lsb reveal [-h] -i INPUT\_IMAGE\_FILE [-e {UTF-8,UTF-32LE}]

[-o SECRET\_BINARY]

optional arguments:

-h, --help show this help message and exit

-i INPUT\_IMAGE\_FILE, --input INPUT\_IMAGE\_FILE

Input image file.

-e {UTF-8,UTF-32LE}, --encoding {UTF-8,UTF-32LE}

Specify the encoding of the message to reveal. UTF-8

(default) or UTF-32LE.

-o SECRET\_BINARY Output **for** the binary secret (Text or any binary

file).

**隐藏和显示短信**

$ stegano-lsb hide -i ./tests/sample-files/Lenna.png -m 'Hello World!' -o ./Lenna\_enc.png

$ stegano-lsb reveal -i ./Lenna\_enc.png

Hello World!

**指定编码**

$ stegano-lsb hide -i ./tests/sample-files/Lenna.png -m 'I love 🍕 and 🍫.' -e UTF-32LE -o ./Lenna\_enc.png

$ stegano-lsb reveal -i ./Lenna\_enc.png

I love 🍕 and 🍫.

默认编码为UTF-8。

**隐藏和显示二进制文件**

$ wget http://www.gnu.org/music/free-software-song.ogg

$ stegano-lsb hide -i ./tests/sample-files/Montenach.png -f ./free-software-song.ogg -o ./Montenach\_enc.png

$ rm free-software-song.ogg

$ stegano-lsb reveal -i ./Montenach\_enc.png -o ./song.ogg

**命令stegano-lsb-set**

使用集是为了选择将隐藏消息的像素。

**隐藏和显示短信**

*# Hide the message with the Sieve of Eratosthenes*

$ stegano-lsb-set hide -i ./tests/sample-files/Montenach.png --generator eratosthenes -m 'Joyeux Noël!' -o ./surprise.png

*# Try to reveal with Mersenne numbers*

$ stegano-lsb-set reveal --generator mersenne -i ./surprise.png

*# Try to reveal with fermat numbers*

$ stegano-lsb-set reveal --generator fermat -i ./surprise.png

*# Try to reveal with carmichael numbers*

$ stegano-lsb-set reveal --generator carmichael -i ./surprise.png

*# Try to reveal with Sieve of Eratosthenes*

$ stegano-lsb-set reveal --generator eratosthenes -i ./surprise.png

另一个例子：

*# Hide the message - LSB with a set defined by the identity function (f(x) = x).*

stegano-lsb-set hide -i ./tests/sample-files/Montenach.png --generator identity -m 'I like steganography.' -o ./enc-identity.png

*# Hide the message - LSB only.*

stegano-lsb hide -i ./tests/sample-files/Montenach.png -m 'I like steganography.' -o ./enc.png

*# Check if the two generated files are the same.*

sha1sum ./enc-identity.png ./enc.png

*# The output of lsb is given to lsb-set.*

stegano-lsb-set reveal -i ./enc.png --generator identity

*# The output of lsb-set is given to lsb.*

stegano-lsb reveal -i ./enc-identity.png

有时跳过一个集合的第一个值会很有用。例如，如果您要隐藏多条消息，或者由于要选择的生成器（Fibonacci以0、1、1等开头）而导致。或者，也许您只是想增加更多的复杂性。在这种情况下，只需使用可选参数--shift：

stegano-lsb-set reveal -i ./tests/sample-files/Lenna.png --generator fibonacci --shift 7

**列出所有可用的发电机**

$ stegano-lsb-set list-generators

Generator id:

ackermann

Desciption:

Ackermann number.

Generator id:

ackermann\_naive

Desciption:

Ackermann number.

Generator id:

carmichael

Desciption:

Composite numbers n such that a^(n-1) == 1 (mod n) **for** every a coprime

to n.

https://oeis.org/A002997

Generator id:

composite

Desciption:

Generate the composite numbers using the sieve of Eratosthenes.

https://oeis.org/A002808

Generator id:

eratosthenes

Desciption:

Generate the prime numbers with the sieve of Eratosthenes.

https://oeis.org/A000040

Generator id:

fermat

Desciption:

Generate the n-th Fermat Number.

https://oeis.org/A000215

Generator id:

fibonacci

Desciption:

Generate the sequence of Fibonacci.

https://oeis.org/A000045

Generator id:

identity

Desciption:

f(x) = x

Generator id:

log\_gen

Desciption:

Logarithmic generator.

Generator id:

mersenne

Desciption:

Generate 2^p - 1, where p is prime.

https://oeis.org/A001348

Generator id:

triangular\_numbers

Desciption:

Triangular numbers: a(n) = C(n+1,2) = n(n+1)/2 = 0+1+2+...+n.

http://oeis.org/A000217

**命令stegano-red**

隐藏和显示带有红色像素部分的文本消息。

**显示帮助**

$ stegano-red hide --help

usage: stegano-red hide [-h] [-i INPUT\_IMAGE\_FILE] [-m SECRET\_MESSAGE]

[-o OUTPUT\_IMAGE\_FILE]

optional arguments:

-h, --help show this help message and exit

-i INPUT\_IMAGE\_FILE, --input INPUT\_IMAGE\_FILE

Image file

-m SECRET\_MESSAGE Your secret message to hide (non binary).

-o OUTPUT\_IMAGE\_FILE, --output OUTPUT\_IMAGE\_FILE

Image file

**隐藏和显示短信**

$ stegano-red hide -i ./tests/sample-files/Lenna.png -m 'Basic steganography technique.' -o ~/Lenna1.png

$ stegano-red reveal -i ~/Lenna1.png

Basic steganography technique.