Análisis de imágenes de satélite con Python y técnicas de inteligencia artificial

Universidad Técnica Nacional – Cañas – Costa Rica

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Julio 2023

Telecommunications Engineer
Working as Head of Health Data @BSC
More than 20 years teaching

open data - open source – open science

I am Alberto

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/in/albertolabarga

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Contenido

- Introducción a la programación en Python
- Análisis de datos geospaciales en Python
- Manejo de imágenes de satélite con Python
- Técnicas de aprendizaje automático e inteligencia artificial con Python
- Aplicaciones prácticas de análisis de imágenes de satélite

alabarga / **geospatial-python-cr23**

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Code | Issues | Pull requests | Actions | Projects | Wiki | Security | Insights | Settings

Code

main

Go to file t

- course
  - sesion-1-python
  - sesion-2-geopandas-folium
  - sesion-3-geospatial-python
  - sesion-4-satellite-imaging
  - sesion-5-ai-machine-learning/not…
  - .gitignore
  - Dockerfile
  - INSTALL.md

geospatial-python-cr23 / **course** /

Add file

alabarga Create README.md — ebd8edd · 39 minutes ago — History

Name	Last commit message	Last commit date
..		
sesion-1-python	Reorganize modules	1 hour ago
sesion-2-geopandas-folium	Reorganize modules	1 hour ago
sesion-3-geospatial-python	Create README.md	39 minutes ago
sesion-4-satellite-imaging	Reorganize modules	1 hour ago
sesion-5-ai-machine-learning/notebooks	UPdate course	3 days ago

https://github.com/alabarga/geospatial-python-cr23/

Visualizing Real World Data

Feature

Is data scientist sexiest job of the century?

This scientific work is a fast evolving profession, **Karla Dondio** writes.

Data Scientist:
The Sexiest Job of the 21st Century

Meet the people who can coax treasure out of messy, unstructured data.

https://hbr.org/2012/10/data-scientist-the-sexiest-job-of-the-21st-century

Harvard Business Review

DATA

Data Scientist: The Sexiest Job of the 21st Century

by Thomas H. Davenport and D.J. Patil

FROM THE OCTOBER 2012 ISSUE

SUMMARY | SAVE | SHARE | COMMENT 4 | TEXT SIZE | PRINT

When Jonathan Goldman arrived for work in
the business networking site, the place still
company had just under 8 million accounts
growing quickly as existing members invited their friends a

SPOTLIGHT ON BIG DATA

Spotlight

ARTWORK Tamar Cohen, *Andrew J Buboltz*
2011, silk screen on a page from a high school yearbook, 8.5" x 12"

Data Scientist:
The Sexiest Job of the 21st Century

Meet the people who can coax treasure out of messy, unstructured data.
by Thomas H. Davenport and D.J. Patil

HOME > ECONOMY

ChatGPT may be coming for our jobs. Here are the 10 roles that AI is most likely to replace.

Aaron Mok and Jacob Zinkula Feb 2, 2023, 5:25 PM

Insider compile

PT, according to experts. J

ChatGPT Will Replace Programmers Within 10 Years

Predicting The End of Manmade Software

OpenAI's DALL-E prompted with "photo-realistic 3D robot destroying a computer"

≡ Forbes

Will ChatGPT Put Data Analysts Out Of Work?

Bernard Marr Contributor

Feb 7, 2023, 01:40am EST

If your work involves analyzing and reporting on data, then it's understandable that you might feel a bit concerned by the rapid advances being made by artificial intelligence (AI). In particular, the viral ChatGPT app has captured the imagination of the general public in recent months, acting as a powerful demonstration of what AI is already capable of. For some, it may also seem like a warning about what might be in store for the future.

Will ChatGPT Put Data Analysts Out of Work? ADOBE STOCK

Cookies on Forbes

42

42º

42ºC

42ºC

temperatura en **Barcelona** el **25 de Julio de 2022**

Global temperature change (1850–2017)
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
2.0°C
1.5°C
2017
@ed_hawkins
HadCRUT4.6
Baseline: 1850–1900

782356
87901116
01001100
94560156
01000100100
000012
01296712
91236742323
01001100
8765432
23487923
5678234

every MINUTE of the DAY
UBER
PASSENGERS TAKE 694 RIDES
facebook
USERS LIKE 4,166,667 POSTS
twitter
USERS SEND 347,222 TWEETS
YouTube
USERS UPLOAD 300 HOURS OF NEW VIDEO
Instagram
USERS LIKE 1,736,111 PHOTOS
Pinterest
USERS PIN 9,722 IMAGES
Apple
USERS DOWNLOAD 51,000 APPS
NETFLIX
SUBSCRIBERS STREAM 77,160 HOURS OF VIDEO
reddit
USERS CAST 18,327 VOTES
amazon
RECEIVES 4,310 UNIQUE VISITORS
Vine
USERS PLAY 1,041,666 VIDEOS
tinder
USERS SWIPE 590,278 TIMES
snapchat
USERS SHARE 284,722 SNAPS
BuzzFeed
USERS VIEW 34,150 VIDEOS
skype
users make 110,040 calls
Source: www.domo.com

10^{27}
Brontobyte
This will be our digital universe tomorrow...
10^{24}
Yottabyte
This is our digital universe today
10^{21}
Zetabyte
1.3 ZB network traffic by 2016
10^{18}
Exabyte
1EB of data is created on the Internet each day - 250 million DVDs
10^{15}
Petabyte
The CERN Large Hadron Collider generates 1PB per second
10^{12}
Terabyte
500TB of new data per day are ingested in Facebook databases
10^{9}
Gigabyte
10^{6}
Megabyte

https://www.ted.com/talks/hans_rosling_the_best_stats_you_ve_ever_seen

Hans Rosling
Sweden 1948

https://www.youtube.com/watch?v=jbkSRLYSojo

https://www.gapminder.org/tools/#$chart-type=bubbles

https://www.google.com/publicdata/directory

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812–1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite.

Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zônes colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zônes. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. —— Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M.M. Thiers, de Ségur, de Fezensac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilow et ont rejoint vers Orscha et Witebsk, avaient toujours marché avec l'armée.

Autog. par Regnier, 8. Pas. Ste Marie St Gain à Paris.

Imp. Lith. Regnier et Dourdet.

Where people born in California **have moved to**:

New! Switch to Migration Into California

Select any state

Foreign immigration is a hot topic these days, but the movement of people from one state to another can have an even bigger influence on the United States' economy, politics and culture. Americans have already seen this with the Western expansion, the movement of Southern blacks to Northern cities and the migration from the Rust Belt.

TWEET THIS CHART

SHARE ON FACEBOOK

PIN THIS CHART

https://www.nytimes.com/interactive/2014/08/13/upshot/where-people-in-each-state-were-born.html

http://mwcimpact.com/

BBVA
Tourists from
all countries
SELECT CATEGORY AND NATIONALITY
TRANSACTIONS
TOURIST TRAVELS
LOCAL STATISTICS
TRENDS
TOURISM WEIGHT
Málaga Costa del Sol
Guillena
Brenes
Alcalá del Río
La Algaba
Mairena del Aljarafe
Alcalá de Guadaíra
Dos Hermanas
Utrera
TOP COUNTRIES BY € SPENT IN SEVILLA
1. France (1,684,345€)
2. United Kingdom (876,323€)
3. United States of America (637,322€)
4. Italy (558,215€)
5. Portugal (342,714€)
Thu 14/8/2014 18:00
Leaflet | © Mapbox © OpenStreetMap, CartoDB attribution
TOTAL SPENDING

http://www.nytimes.com/interactive/dining/new-york-health-department-restaurant-ratings-map.html?_r=0

http://illustreets.co.uk/

https://inequality.media.mit.edu/

https://widgets.elpais.com/mapbox/participacion-elecciones/index.html

enzar a usar Firef...

Pamplona/Iruña (Distrito: 4, secc: 25)

Participación	73 %	Censo	1.695 Habitantes
PP	28 %	ERC	0 %
PSOE	16 %	CDC	0 %
UP	31 %	PNV	0 %
Cs	6 %	Bildu	11 %
VOX	0 %	CC	0 %

Global temperature change (1850–2017)
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
2.0°C
1.5°C
2017
@ed_hawkins
HadCRUT4.6
Baseline: 1850–1900

https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6

https://kepler.gl/

DN.LABORATORIO

EL LABORATORIO

EQUIPO

BLOG

TRABAJOS

CONTACTO

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Los desahucios amenazaron a más de 500 familias en Navarra en el último año

Destacados

Las zonas donde más bicis se roban en la Comarca de Pamplona

Destacados

http://laboratorio.diariodenavarra.es/

Efecto Airbnb en Pamplona-Iruña

Airbnb y otras plataformas de la llamada economía colaborativa han sido acusadas de contribuir al alza en los precios inmobiliarios y de ser un elemento disruptivo en las comunidades locales. Por otro lado se defiende que la supuesta tendencia gentrificadora de estas webs es exagerada. ¿Quién tiene razón? **¡Que hablen los datos!**

¿Tienes sugerencias, comentarios, propuestas, correcciones, más datos?

CONTÁCTANOS

idena Infraestructura de Datos Espaciales de Navarra

IRUSKAN Pamplona en un click Iruña klik batean

Ayuntamiento de Pamplona
Iruñeko Udala

Resultados (1295)

Nombre Comercial	Vía	Portal	Escalera	Planta	Puerta	C.P.		Distrito	Sección	Epígrafe	Descripción	Fecha alta	Superficie actividad	Superficie local	Polígono	Parcela
	CL. MERCADO	S/N		SSO	89	0	Casco Viejo/Alde Zaharra	1	1	167300	SERVICIOS EN CAFES Y BARES	01/10/2017	4	4	1	1330
CAFE ZENTRAL	CL. MERCADO	S/N		1		0	Casco Viejo/Alde Zaharra	1	1	167150	RESTAURANTES DE UN TENEDOR	21/09/2015	306,5	306,5	1	1330
CAFE ZENTRAL	CL. MERCADO	S/N		1		0	Casco Viejo/Alde Zaharra	1	1	167300	SERVICIOS EN CAFES Y BARES	16/01/2013	590	590	1	1330

Los datos

A
B

CLOSED

OPEN

https://www.youtube.com/watch?v=OM6XllCm_qo

★ make your stuff available on the web (whatever format)

★★ make it available as structured data (e.g. excel instead of image scan of a table)

★★★ non-proprietary format (e.g. csv instead of excel)

★★★★ use URLs to identify things, so that people can point at your stuff

★★★★★ link your data to other people's data to provide context

How to publish Open Data?

5-Star Linking Open Data Scheme

Open data is about MORE THAN DISCLOSURE it must be "Fair"

- Findable
- Accessible
- Interoperable
- Reusable

What is FAIR DATA?

Data and supplementary materials have sufficiently rich metadata and a unique and persistent identifier.

FINDABLE

Metadata and data are understandable to humans and machines. Data is deposited in a trusted repository.

ACCESSIBLE

Metadata use a formal, accessible, shared, and broadly applicable language for knowledge representation.

INTEROPERABLE

Data and collections have a clear usage licenses and provide accurate information on provenance.

REUSABLE

Resultados de las elecciones al Parlamento de Navarra 2019 agrupados por mesas electorales

DESCRIPCIÓN

Resultados definitivos de las elecciones celebradas el año 2019 agrupados por cada mesa electoral. Se incluye merindad, código de municipio, distrito, sección, mesa (distrito, sección, mesa), censo, participación, abstención, votos válidos, etc. así como los datos que obtuvo cada uno de los partidos políticos (votos y porcentaje).
El código de municipio 990 corresponde al registro de residentes ausentes.
Contiene línea de totales.

FICHA TÉCNICA

> **TEMA:** Administración pública

> **CATEGORÍA:** Elecciones

> **DEPARTAMENTO:** Departamento de Presidencia, Función Pública, Interior y Justicia

> **LUGAR:** Navarra

> **LICENCIA:** Creative Commoms by 4.0

> **FECHA DE CREACIÓN:** 11/06/2019

> **FECHA DE ACTUALIZACIÓN:** 11/06/2019

> **FRECUENCIA DE ACTUALIZACIÓN:** Datos inamovibles

> **ETIQUETAS:** Elecciones, Navarra

Envíanos tu opinión. Comenta este conjunto de datos

DESCARGAS

- XML — eXtensible Markup Language
- JSON — JavaScript Object Notation
- CSV — Comma-separated values
- ODS — OpenDocument Spreadsheet
- XLS — Microsoft Office Excel

Síguenos en Twitter @opendata_na

Suscríbete a los cambios de Open Data

Datos

country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898
China	1999	212258	1272915272
China	2000	213766	1280428583

Variables

Observations

Datos

*.xlsx

	A	B	C	D	E	F	G	H	I
1	Codcir	Codmun	Municipio	Mesa	Censo	Certif. Alta	Certif. Correc.	Censo Total	Votos Electores
2	31	1	Abáigar	1-001 -U	80	0	0	80	59
3	31	2	Abárzuza / Abartzuza	1-001 -U	431	0	0	431	290
4	31	3	Abaurregaina / Abaurrea Alta	1-001 -U	117	0	0	117	94
5	31	4	Abaurrepea / Abaurrea Baja	1-001 -U	32	0	0	32	29
6	31	5	Aberin	1-001 -U	281	0	0	281	177
7	31	6	Ablitas	1-001 -A	445	0	0	445	326
8	31	6	Ablitas	1-001 -B	451	0	0	451	341
9	31	6	Ablitas	2-001 -A	495	0	0	495	412
10	31	6	Ablitas	2-001 -B	481	0	0	481	399
11	31	7	Adiós	1-001 -U	126	0	0	126	96
12	31	8	Aguilar de Codés	1-001 -U	64	0	0	64	52
13	31	9	Aibar / Oibar	1-001 -U	669	0	0	669	501
14	31	11	Allín / Allin	1-001 -A	207	0	0	207	165
15	31	11	Allín / Allin	1-001 -B	245	0	0	245	181
16	31	11	Allín / Allin	1-001 -C	252	0	0	252	182
17	31	12	Allo	1-001 -U	765	0	0	765	558
18	31	10	Altsasu / Alsasua	1-001 -A	753	0	0	753	550
19	31	10	Altsasu / Alsasua	1-001 -B	728	0	0	728	517

*.csv

```
Codcir;Codmun;Municipio;Mesa;Censo;Certif. Alta;Certif. Correc.;Censo Total;Votos Totales...
31;1;Abáigar;1-001 -U;80;0;0;80;59;0;59;0;0;18;10;0;4;19;0;0;0;1;0;7
31;2;Abárzuza / Abartzuza;1-001 -U;431;0;0;431;290;0;290;1;3;99;45;4;37;71;1;3;0;2;0;24
31;3;Abaurregaina / Abaurrea Alta;1-001 -U;117;0;0;117;94;0;94;0;1;21;33;1;12;21;2;0;0;0;0;3
31;4;Abaurrepea / Abaurrea Baja;1-001 -U;32;0;0;32;29;0;29;0;0;13;6;0;5;4;0;0;0;0;0;1
31;5;Aberin;1-001 -U;281;0;0;281;177;0;177;2;2;75;23;3;36;22;0;1;0;2;1;10
31;6;Ablitas;1-001 -A;445;0;0;445;326;0;326;5;4;134;9;10;133;20;0;5;0;0;0;6
31;6;Ablitas;1-001 -B;451;0;0;451;341;0;341;3;0;143;8;10;143;10;0;10;2;1;0;11
31;6;Ablitas;2-001 -A;495;0;0;495;412;0;412;7;6;204;3;8;128;26;0;6;4;1;0;19
31;6;Ablitas;2-001 -B;481;0;0;481;399;0;399;1;5;198;7;8;143;17;0;5;0;1;2;12
```

*.xml

```
<table:table-row table:style-name="ro2">
     <table:table-cell table:style-name="ce2" office:value-type="float"
                        office:value="31" calcext:value-type="float">
      <text:p>31</text:p>
     </table:table-cell>
     <table:table-cell table:style-name="ce2" office:value-type="float"
                       office:value="1" calcext:value-type="float">
      <text:p>1</text:p>
     </table:table-cell>
     <table:table-cell table:style-name="ce2" office:value-type="string"
                       calcext:value-type="string">
      <text:p>Abáigar</text:p>
     </table:table-cell>
     <table:table-cell table:style-name="ce2" office:value-type="string"
                       calcext:value-type="string">
      <text:p>1-001 -U</text:p>
     </table:table-cell>
     <table:table-cell table:style-name="ce5" office:value-type="float"
                       office:value="80" calcext:value-type="float">
      <text:p>80</text:p>
     </table:table-cell>
...
</table:table-row>
```

*.json


```
{
  "Codcir": "31",
  "Codmun": 1,
  "Municipio": "Abáigar",
  "Mesa": "1-001 -U",
  "Censo": 80,
  "Certif. Alta": 0,
  "Certif. Correc.": 0,
  "Censo Total": 80,
  "Votos Electores": 59,
  "Votos Interventores": 0,
  "Votos Totales": 59,
  "Votos Nulos": 0,
  "Votos Blancos": 0,
  "NA+": 18,
  "EH Bildu": 10,
  "I-E (n)": 0,
  "PSN-PSOE": 4,
  "GBAI": 19,
  "SAIN": 0,
  "VOX": 0,
  "EQUO": 0,
  "RCN-NOK": 1,
  "Ln": 0,
  "PODEMOS": 7
}
```

*.gdf

```
nodedef>name VARCHAR,label VARCHAR,partido VARCHAR
0,Pau Marí-Klose,PSOE
1,Ana Prieto Nieto,PSOE
2,Francisco Polo,PSOE
3,Íñigo Errejón,PODEMOS
4,Pablo Iglesias,PODEMOS
5,Pablo Echenique Robba,PODEMOS
6,Pedro Sánchez,PSOE
7,Patxi López,PSOE
edgedef>node1 VARCHAR,node2 VARCHAR
301,16
301,191
301,180
301,183
301,185
```

División Administrativa. Límites catastrales de los municipios de Navarra actuales

DESCRIPCIÓN

Capa informativa de polígonos con la delimitación catastral de los municipios de Navarra actual.

FICHA TÉCNICA

> **TEMA:** Territorio y urbanismo, Territorio y urbanismo

> **CATEGORÍA:** Geográfica / cartográfica

> **DEPARTAMENTO:** Otros órganos

> **LUGAR:** Navarra

> **LICENCIA:** Creative Commoms by 4.0

> **FECHA DE CREACIÓN:** 30/12/2010

> **FECHA DE ACTUALIZACIÓN:** 24/06/2019

> **FRECUENCIA DE ACTUALIZACIÓN:** Según necesidad

Envíanos tu opinión. Comenta este conjunto de datos

DESCARGAS

SHP Shapefile

Síguenos en Twitter @opendata_na

Suscríbete a los cambios de Open Data

*.shp

```
unzip MEMHCA_Sym_Fosas.zip
Archive:  MEMHCA_Sym_Fosas.zip
  inflating: MEMHCA_Sym_Fosas.dbf
  inflating: MEMHCA_Sym_Fosas.prj
  inflating: MEMHCA_Sym_Fosas.shp
  inflating: MEMHCA_Sym_Fosas.shx
```

MEMHCA_Sym_Fosas.prj

```
PROJCS["ETRS89 / UTM zone
30N",GEOGCS["ETRS89",DATUM["European_Terrestrial_Reference_System_1989",SPHEROID["GRS
1980",6378137,298.257222101,AUTHORITY["EPSG","7019"]],AUTHORITY["EPSG","6258"]],PRIMEM["Gre
enwich",0,AUTHORITY["EPSG","8901"]],UNIT["degree",0.01745329251994328,AUTHORITY["EPSG","912
2"]],AUTHORITY["EPSG","4258"]],UNIT["metre",1,AUTHORITY["EPSG","9001"]],PROJECTION["Transve
rse_Mercator"],PARAMETER["latitude_of_origin",0],PARAMETER["central_meridian",-
3],PARAMETER["scale_factor",0.9996],PARAMETER["false_easting",500000],PARAMETER["false_nort
hing",0],AUTHORITY["EPSG","25830"],AXIS["Easting",EAST],AXIS["Northing",NORTH]]
```

*.json, *.geojson, *.topojson


```
"FeatureCollection"
[
  {
    "type": "Feature",
    "geometry": {
      "type": "Point",
      "coordinates": [
        580388.2073999997,
        4721926.0122
      ]
    },
    "properties": {
      "FEATURE": 50200001,
      "CLUGAR": 31,
      "LUGAR": "Fosa del Caserío de Echávarri",
      "TIPO": "Intervenida",
      "UBICACION": "La fosa podría ubicarse junto en las proximidades al
                    Caserío de Echávarri, en la carretera NA-122 que va
                    de Estella a Aberin.",
      "FECHASUCE": "",
      "URL": "http://fosas.navarra.es/?idfosa=31",
      "NUMVICTIMA": 8,
      "MUNICIPIO": "Estella-Lizarra",
      "RADIO": 250,
      "BEGINLIFE": "30/11/2019"
    }
  },
…
]
```

https://mapshaper.org/

*.pdf

components of the PDF are easily available for you to manipulate

fully responsive document with semantic content and logical reading order built for you

meet common accessibility standards, such as WCAG 2.0 and PDF/UA

DF responsive revolution

We all dislike reading PDF documents on our smart phones. Pinch in, pinch out, scroll around and attempt to read what was originally designed to be shown on a screen over 10 times larger. Then there's filling in a PDF Form on your smart phone – close to impossible. So it appears that our beloved smart phone isn't smart enough to handle viewing PDFs – We have a solution…

The PDF format was not originally designed to be flexible when viewing. It was designed to simulate printed or displayed content similar to reading a book, magazine or newspaper. But smart phones and other small devices are simply too small to view the entire page, so the user has to zoom and scroll to view the content.

Platforms and languages

LANGUAGES SUPPORT	
C/C++	yes
JAVA	yes
C# & .NET	yes
OBJECTIVE-C	soon
.NET Core	soon

MOBILE DEVELOPMENT SUPPORT	
ANDROID	yes
iOS	yes

DESKTOP DEVELOPMENT SUPPORT	
Windows	yes
Mac	yes
Linux	yes

Forms API

Having issues getting information in or out of AcroForms? Our API has this covered as well which streamline any data collection tasks you may

With the availability to sign PDF's with both **eSignatures** and **Digital Signatures** we have

Tabula My Files My Templates About Help Source Code Support Tabula on OpenCollective!

Import one or more PDFs

Browse… Import

Imported PDFs

File Name	Size	Pages	Date Added	Remove	Process
20200210-sitrep-21-ncov.pdf	932 kB	6	11 Feb 2020 22:49	✖	Extract Data

If you have several PDFs with the same layout, you can select the appropriate regions once, then save the selections as a Tabula Template from the Select Tables page. If someone has shared a template with you, you can upload it to Tabula at the My Templates page.

https://tabula.technology/

API LIST

A Collective List Of APIs. Build Something.

Search

All

GRID LIST

AMAZON S3 API

API2CART

BEST BUY COMMERCE API

https://apilist.fun/

Scrapy

Build and run your
web spiders

Terminal

```
$ pip install scrapy
$ cat > myspider.py <<EOF
import scrapy

class BlogSpider(scrapy.Spider):
    name = 'blogspider'
    start_urls = ['https://blog.scrapinghub.com']

    def parse(self, response):
        for title in response.css('.post-header>h2'):
            yield {'title': title.css('a ::text').get()}

        for next_page in response.css('a.next-posts-link'):
            yield response.follow(next_page, self.parse)
EOF
$ scrapy runspider myspider.py
```

https://scrapy.org/

https://scihub.copernicus.eu/

Tools

Tools