

How to research governmental web data?

daniel.gomes@fccn.pt



ARQUIVO.PT

Who are we?



Free online service to research the Past Web






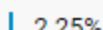

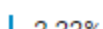



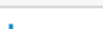

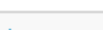

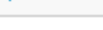

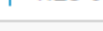

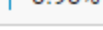
Preserves **publicly accessible** information.

Governmental service provided by the Ministry of Science and Higher Education (Portugal)

A digital **research infrastructure**

Arquivo.pt is used world-wide



Country	Users	% Users
1.  Portugal	46,891	 46.56%
2.  United States	26,373	 26.19%
3.  Brazil	2,266	 2.25%
4.  Russia	2,234	 2.22%
5.  United Kingdom	2,231	 2.22%
6.  Japan	2,172	 2.16%
7.  Canada	1,237	 1.23%
8.  Mozambique	1,213	 1.20%
9.  India	902	 0.90%
10.  Germany	894	 0.89%

- 53% of users are international
- User Interfaces and documentation also in English
- Combined with Google Translate enables **cross-lingual access** to preserved content

Arquivo.pt preserves national and international historical web content

GALILEO Versão 2.0

Janeiro 1993

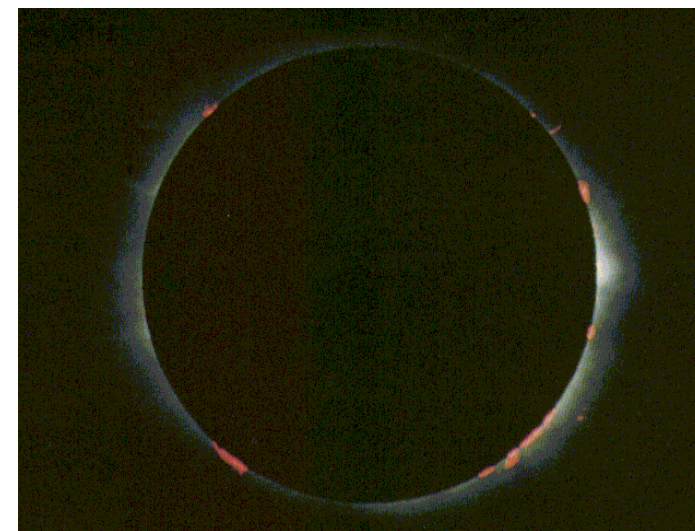
Manual de utilização e sugestões de exploração	<i>AUTORES</i> Programação: João Veloso Manual: Elisa Prata Pina e M. Augusta Patrício Orientação: Carlos Fiolhais
--	---

Departamento de Física da Universidade de Coimbra

ÍNDICE

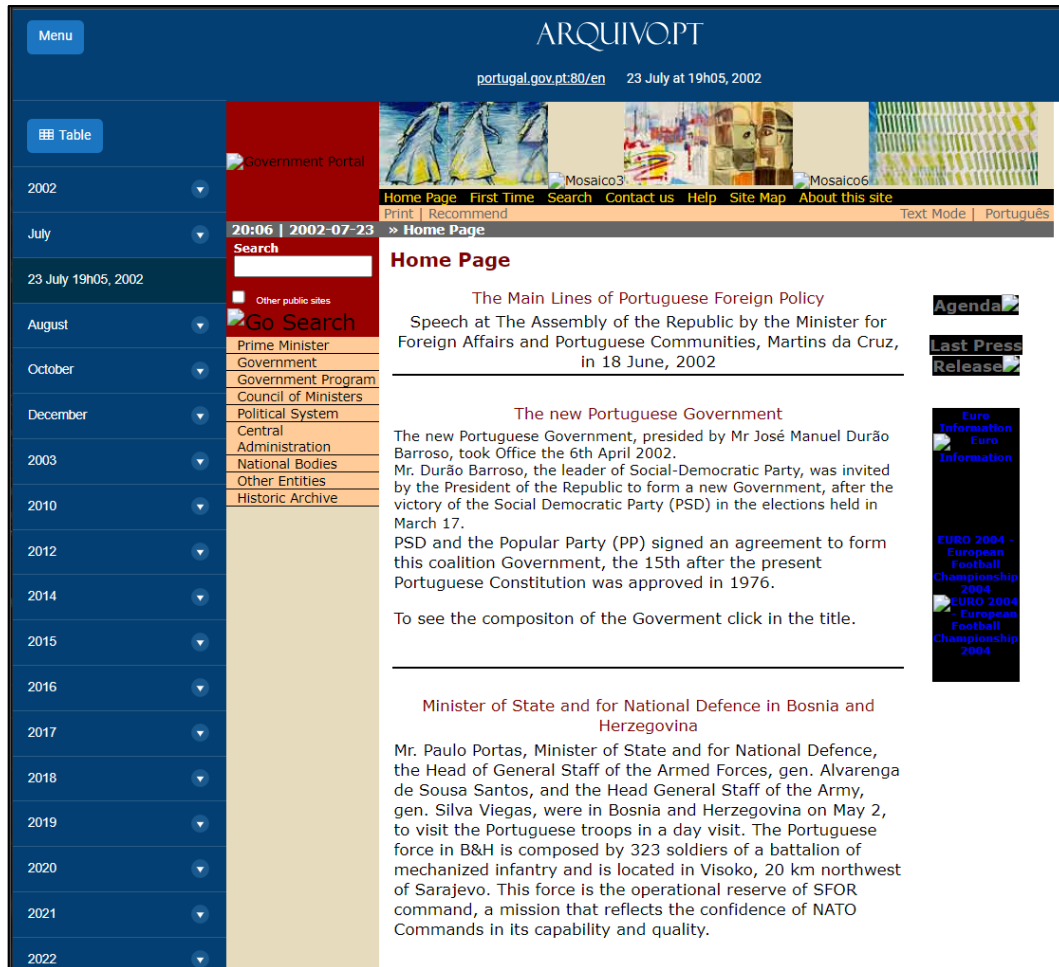
1. Apresentação sumária do programa
2. Características do equipamento
3. Configuração mínima do computador
4. Ficheiros do programa

nautilus.fis.uc.pt - 1993
(oldest page)



spacelink.nasa.gov – 1992
(oldest image)

Special attention to the preservation of governmental web data



Arquivo.pt is responsible for the preservation of Public Administration websites, such as the “Government Portal”

What is “governmental web data”?

“Governmental web data” is online information **produced by** public sector entities

- Laws, decisions, press-releases, open data sets
- Governments communicate with their citizens through the web (almost exclusively)

“Governmental web data” is online information **published about** public sector entities

- Online news, public discussions or activism platforms
- Scrutinize governmental activities

Why is it interesting to research governmental web data?

The web became a crucial resource of information for **contemporary political, social or historical research**.

Accurate studies about governments of the XXI century **require the analysis of online information across time**.

The problem is that even governmental data **quickly vanishes from the web**.



404 ERROR

PAGE NOT FOUND

How to select governmental web data to be preserved?

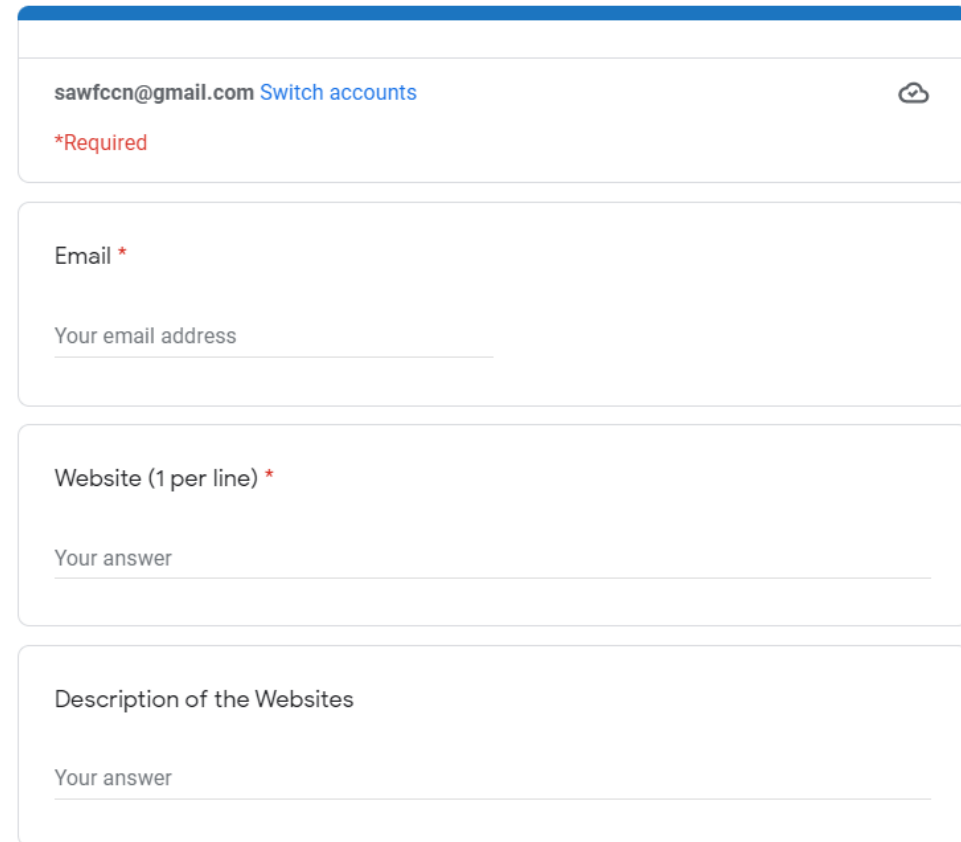
Combining experts with
automated methods

Receive **suggestions** of websites to be preserved

- Public form
 - Any domain
 - Any language
 - Submit home page
- arquivo.pt/suggest

Suggest websites to be preserved

International websites are welcome!



The screenshot shows a web form titled "Suggest websites to be preserved". At the top, it says "International websites are welcome!". Below this is a header bar with the email "sawfccn@gmail.com" and a "Switch accounts" link. A red asterisk indicates a required field. The form consists of three main input sections: "Email *" with a placeholder "Your email address", "Website (1 per line) *" with a placeholder "Your answer", and "Description of the Websites" with a placeholder "Your answer".

sawfccn@gmail.com [Switch accounts](#)

*Required

Email *

Your email address

Website (1 per line) *

Your answer

Description of the Websites

Your answer

SavePageNow: Archive a webpage immediately

ARQUIVO.PT

■ SavePageNow Record webpages on Arquivo.pt

Page address

Record

e.g. www.fccn.pt

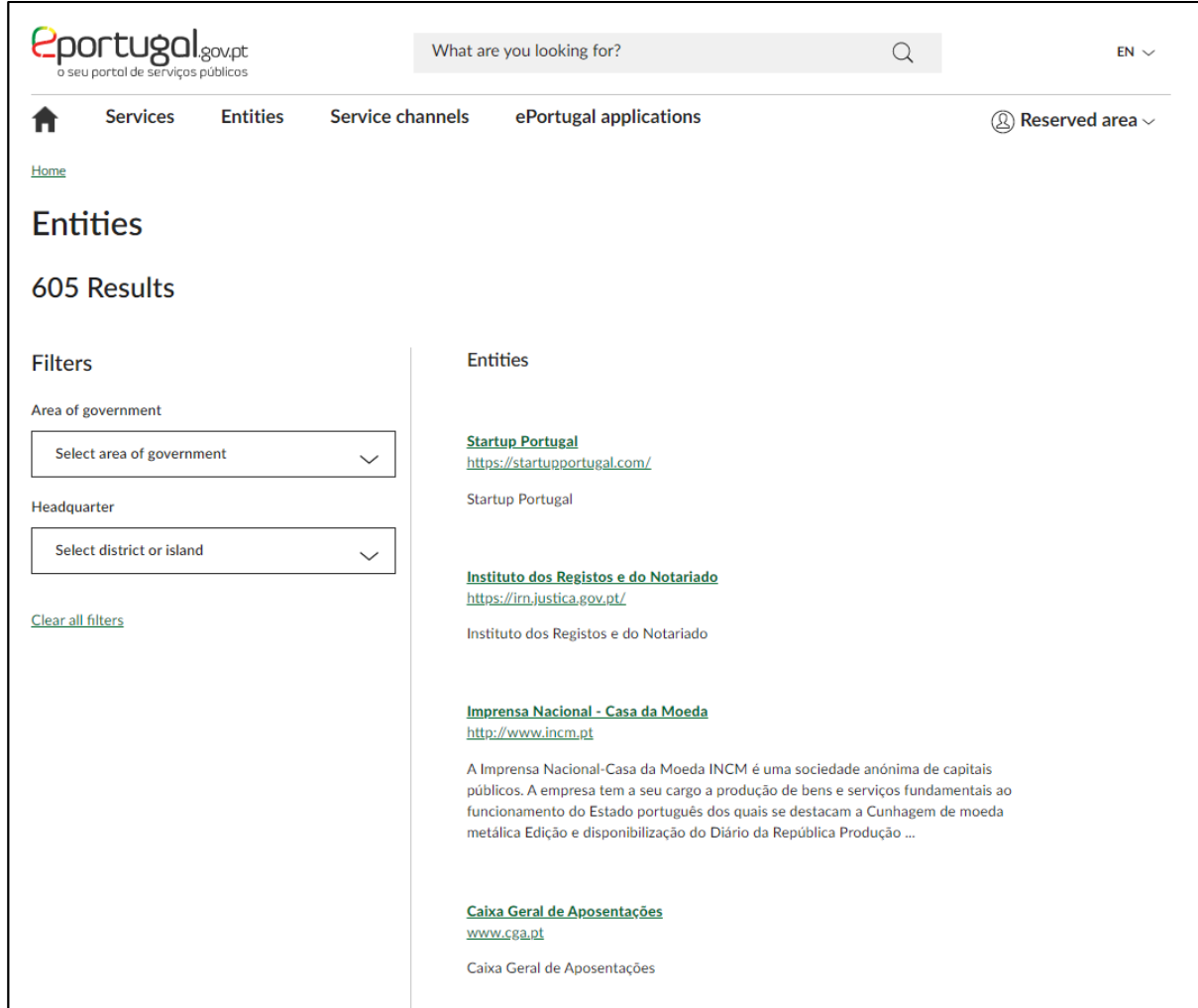
The SavePageNow service allows a page to be archived at the exact moment the user makes the request.

The archived contents are later integrated in the Arquivo.pt collection.

[Learn more](#)

arquivo.pt/savepagenow

Lists of official public sector websites



The screenshot displays the eportugal.gov.pt website interface. At the top, the logo "eportugal.gov.pt" is visible with the tagline "o seu portal de serviços públicos". A search bar contains the text "What are you looking for?". The navigation menu includes "Home", "Services", "Entities", "Service channels", "ePortugal applications", and a "Reserved area" with a user icon. The "Entities" section is active, showing "605 Results". On the left, there are filters for "Area of government" and "Headquarter", both with dropdown menus. A "Clear all filters" link is also present. The main content area lists three entities: "Startup Portugal" with its URL, "Instituto dos Registos e do Notariado" with its URL, and "Imprensa Nacional - Casa da Moeda" with its URL and a brief description. The "Caixa Geral de Aposentações" is also listed at the bottom.

eportugal.gov.pt
o seu portal de serviços públicos

What are you looking for?

EN

Home Services Entities Service channels ePortugal applications Reserved area

Home

Entities

605 Results

Filters

Area of government

Select area of government

Headquarter

Select district or island

[Clear all filters](#)

Entities

[Startup Portugal](https://startupportugal.com/)
Startup Portugal

[Instituto dos Registos e do Notariado](https://irn.justica.gov.pt/)
Instituto dos Registos e do Notariado

[Imprensa Nacional - Casa da Moeda](http://www.incm.pt)
A Imprensa Nacional-Casa da Moeda INCM é uma sociedade anónima de capitais públicos. A empresa tem a seu cargo a produção de bens e serviços fundamentais ao funcionamento do Estado português dos quais se destacam a Cunhagem de moeda metálica Edição e disponibilização do Diário da República Produção ...

[Caixa Geral de Aposentações](http://www.cga.pt)
Caixa Geral de Aposentações

Selecting online about **events** is harder (eg. elections)

- Information is spread across various websites.
- Quickly appears before the elections.
- Quickly disappears after the elections.
- A challenging problem but a great use case for web archives.



Developed a low-cost methodology to automatically select and obtain web data for research

1. Define research question
 2. Identify relevant keywords (Google Sheet)
 3. Search through APIs (Bing)
to get *seed* URLs
 4. Crawl *seeds* from the live-web (Heritrix)
 5. Process crawled web data (Hadoop)
 6. Provide access to research web data through Arquivo.pt services
(arquivo.pt/catalog)
- See “Preserving Websites Of Research & Development Projects”, Ipres 2016

Preserving Websites Of Research & Development Projects



Daniel Bicho
Foundation for Science and Technology:
Arquivo.pt
Av. do Brasil, 101
1700-066 Lisboa, Portugal
daniel.bicho@fccn.pt

Daniel Gomes
Foundation for Science and Technology:
Arquivo.pt
Av. do Brasil, 101
1700-066 Lisboa, Portugal
daniel.gomes@fccn.pt











How to assure the
accessibility of historical
web data?




Public list of Arquivo.pt **collections**

List of the collections preserved by Arquivo.pt (publicly available)  

File Edit View Insert Format Data Tools Add-ons Help [Last edit was made on 10 September by SAW - FCCN Serviços e Arquivos Web](#)

100% \$ % 0.00 123 10 B I S A          

A2  =IMPORTRANGE("https://docs.google.com/spreadsheets/d/1hFLyqN2ZJEd1hra2V00PI24jTy42Byr6M667rG-oHo/edit", "Summary!A2:G")

	A	B	C	D	E	F	G	H
	Collection ID	Description	Collection Start date	Collection End date	Total files (Number of URLs collected)	Total seeds (Preserved sites)	Total volume of WARCS files (TB)	Collection in Production? (URL, Page and Image indexed)
1								
2	AWP1	1st Complete crawl of the Portuguese web, mainly from the .PT domain, in 2008.	2008-02-12	2008-03-06	56,046,288	154,787	1.60	<input checked="" type="checkbox"/>
3	AWP2	2nd Complete crawl of the Portuguese web, mainly from the .PT domain, in 2008.	2008-03-11	2008-05-30	48,718,404	-	1.60	<input checked="" type="checkbox"/>
4	AWP3	3rd Complete crawl of the Portuguese web, mainly from the .PT domain, in 2008.	2008-10-21	2008-12-10	51,863,006	193,294	2.00	<input checked="" type="checkbox"/>
5	AWP4	4th Complete crawl of the Portuguese web, mainly from the .PT domain, in 2009.	2009-05-01	2009-05-31	68,776,707	366,880	2.50	<input checked="" type="checkbox"/>
6	AWP5	5th Complete crawl of the Portuguese web, mainly from the .PT domain, in 2009.	2009-10-01	2009-10-31	119,135,566	373,323	3.80	<input checked="" type="checkbox"/>
7	AWP6	6th Complete crawl of the Portuguese web, mainly from the .PT domain, in 2009.	2009-12-01	2009-12-31	118,810,364	340,018	3.50	<input checked="" type="checkbox"/>
8	AWP7	7th Complete crawl of the Portuguese web, mainly from the .PT domain, in 2010.	2010-05-01	2010-05-31	87,988,812	389,957	2.90	<input checked="" type="checkbox"/>
9	AWP8	Incremental crawl of the Portuguese web web, mainly from the .PT domain, in 2010. The AWP8 crawl is incremental because it was performed using DeDuplicator (http://landsbokasafn.github.io/DeDuplicator/) taking the content of AWP7 as baseline. Thus, the files that remained unchanged from the AWP7 complete crawl were not archived (duplicated) on the AWP8 incremental crawl.	2010-08-01	2010-08-31	75,771,317	411,562	1.90	<input checked="" type="checkbox"/>

arquivo.pt/collections

Open datasets about thematic collections



27 datasets 0 private datasets 5 members 4 followers Dashboard

 Galerias e artistas: preservação de conteúdos no 0 0 Punctual	 Partidos políticos em Portugal: websites e histórico no 0 0 Punctual	 Websites dos projetos de Investigação & 0 0 Punctual
 Páginas do Governo de Portugal nas redes sociais e 0 0 Annual	 Websites do Governo Regional dos Açores e histórico de 0 0 Annual	 Websites da Administração Pública no portal 0 0 Annual
 Websites do Governo da Regional Madeira e histórico 0 0 Annual	 Agrupamentos de Escolas ou Escolas não Agrupadas: 0 0 Annual	 Freguesias de Portugal: websites e histórico de 0 0 Annual

See the 27 datasets

DOWNLOAD AS CSV



arquivo.pt/dadosabertos

Existing open datasets are complemented with links to URLs and web archives

title	endDate	projectUrl	totalCost	URLsBingSearch	ArchivedProjectURLs
MARine MAnagement and Ecosystem Dynamics under climate change	2019-09-30	https://www.marmaed.uio.no/	4073903,28		https://arquivo.pt/wayback/https://www.marmaed.uio.no/
Services to enhance innovation management capacities of SMEs in England, Northern Ireland and Wales 2015 -2016	2016-12-31	http://www.enterprise-europe.co.uk/	2336311,17		https://arquivo.pt/wayback/http://www.enterprise-europe.co.uk/
Developing novel tools and technologies to assess the safety and efficacy of cell-based regenerative medicine therapies, focusing on kidney disease	2022-10-31		4071175,56	https://www.findaphd.com/phds/project/assess-the-safety-and-efficacy-of-renal-regenerative-medicine-therapies-using-advanced-imaging-technologies-renaltoolbox-project/?p101521 , https://www.liverpool.ac.uk/mathematical-sciences/staff/rachel-bearon/research/ , https://www.liverpool.ac.uk/veterinary-science/staff/lorenzo-ressel/research/ , https://www.cyanagen.com/grants/ , https://umexpert.um.edu.my/selvee.html , https://iroffice.msu.ac.th/th/index.php/scholarships/128-european-funding-and-fellowship-opportunities , https://www.ukrmp.org.uk/reports_and_papers/imaging-technologies-for-monitoring-the-safety-efficacy-and-mechanisms-of-action-of-cell-based-regenerative-medicine-therapies-in-models-of-kidney-disease/ , https://onlinelibrary.wiley.com/doi/full/10.1002/jev2.12033 , https://www.autocrat.eu/author/admin/ , https://translational-medicine.biomedcentral.com/articles/10.1186/s12967-019-1994-0 , https://onlinelibrary.wiley.com/doi/full-xml/10.1002/jev2.12033 , https://renaltoolbox.org/imaging-technologies-to-evaluate-safety-and-efficacy/ , https://www.findaphd.com/phds/project/developing-mathematical-tools-for-image-analysis-to-evaluate-the-effects-of-regenerative-medicine-therapies-on-kidney-function-renaltoolbox-project/?p101518 , https://en.unito.it/research/research-projects-and-initiatives/international-research-projects/marie-sklodowska-curie , https://region8.healthresearch.ph/index.php/11-announcement/165-europe-asean-research-funding-and-fellowship-opportunities , https://www.mdpi.com/journal/jcm/special_issues/Osteoarthritis_Management_and_Regenerative_Strategies , https://www.omicsonline.org/ , https://www.omicsonline.org/scholarly/methods-and-techniques-in-molecular-biology-journals-articles-ppts-list.php , https://royalsocietypublishing.org/doi/10.1098/rstb.2017.0229 , https://uctranslationalmedicine.org/mtm-final-symposium-2021/ , https://www.nature.com/articles/s41536-021-00154-y , https://europepmc.org/article/MED/32292894	https://arquivo.pt/wayback/https://www.findaphd.com/phds/project/assess-the-safety-and-efficacy-of-renal-regenerative-medicine-therapies-using-advanced-imaging-technologies-renaltoolbox-project/?p101521 , https://arquivo.pt/wayback/https://www.liverpool.ac.uk/mathematical-sciences/staff/rachel-bearon/research/ , https://arquivo.pt/wayback/https://www.liverpool.ac.uk/veterinary-science/staff/lorenzo-ressel/research/ , https://arquivo.pt/wayback/https://www.cyanagen.com/grants/ , https://arquivo.pt/wayback/https://umexpert.um.edu.my/selvee.html , https://arquivo.pt/wayback/https://iroffice.msu.ac.th/th/index.php/scholarships/128-european-funding-and-fellowship-opportunities , https://arquivo.pt/wayback/https://www.ukrmp.org.uk/reports_and_papers/imaging-technologies-for-monitoring-the-safety-efficacy-and-mechanisms-of-action-of-cell-based-regenerative-medicine-therapies-in-models-of-kidney-disease/ , https://arquivo.pt/wayback/https://onlinelibrary.wiley.com/doi/full/10.1002/jev2.12033



Cordis-h2020organizationsComplementedByArquivoPT.xlsx

Dataset contendo a listagem das organizações dos projetos financiados pelo programa H2020 (Horizon 2020 - European Commission)

Pontual

↻ 0

★ 0

Search **texts** from the past in any language

[Menu](#) ARQUIVO.PT [Options](#)

[Search](#)

1996
1 Jan

2021
12 Nov

[Pages](#) [Images](#) [Narrative](#) [Advanced search](#)

About 23,322 results since 1996 until 2021

[→ berlin.msz.gov.pl/pl](#)
Ambasada RP w Berlinie
30 March 2019
Ambasada RP w Berlinie Masz wyłączoną obsługę języka JavaScript Polski Deutsch RSS Wersja tekstowa Być wiernym Ojczyźnie mej, Rzeczypospolitej Polskiej Aktualności **Ambasada** Współpraca dwustronna ... się zwrócić? Zasady realizacji projektów polonijnych Praktyki **Ambasada** **Ambasada** **Ambasada RP** w ...

[→ dublin.msz.gov.pl/pl](#)
Ambasada RP w Dublinie
10 June 2017
Ambasada RP w Dublinie Masz wyłączoną obsługę języka JavaScript English Polski RSS Wersja tekstowa Polsce – służyć, Europę – tworzyć, Świat – rozumieć Aktualności **Ambasada** Współpraca dwustronna ... WYDZIAŁEM KONSULARNYM **Ambasada** **Ambasada RP** w Dublinie 5 Ailesbury Road Ballsbridge D04 W221 Dublin ...

Search the **history** of a web address

Menu ARQUIVO.PT

Q bbc.co.uk Search

1996 1 Jan 2021 12 Nov

Pages Images Narrative Advanced search

Cerca de 2,538 resultados desde 1996 a 2021

Table List

2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
15 Feb	4 May	29 May	4 Jan	21 Jan	10 Jan	5 Sep	1 Jan	1 Jan	20 Jan	1 Jan	1 Jan	1 Jan	3 Jan
14 Mar	20 May	30 May	6 Jan	27 Jan	11 Jan	7 Sep	2 Jan	2 Jan	9 Feb	1 Jan	2 Jan	1 Jan	3 Jan
22 Oct	20 May	4 Aug	12 Jan	31 Jan	12 Jan	23 Sep	3 Jan	4 Jan	10 Feb	2 Jan	3 Jan	2 Jan	3 Jan
22 Oct	11 Jun		12 Jan	11 Mar	15 Jan	24 Sep	4 Jan	8 Jan	3 Apr	2 Jan	4 Jan	3 Jan	4 Jan
23 Oct	22 Jun		14 Jan	12 Mar	17 Jan	26 Sep	5 Jan	8 Jan	4 Apr	2 Jan	5 Jan	4 Jan	4 Jan
	6 Aug		21 Jan	13 Mar	18 Jan	27 Sep	6 Jan	17 Jan	5 Apr	3 Jan	6 Jan	5 Jan	4 Jan
	6 Aug		21 May	14 Mar	19 Jan	28 Sep	8 Jan	17 Jan	6 Apr	3 Jan	7 Jan	6 Jan	6 Jan
	3 Sep		1 Jul	15 Mar	22 Jan	30 Sep	10 Jan	21 Jan	7 Apr	3 Jan	8 Jan	7 Jan	6 Jan
	3 Sep		1 Dez	16 Mar	23 Jan	4 Oct	10 Jan	24 Jan	8 Apr	3 Jan	9 Jan	8 Jan	6 Jan
	4 Sep		2 Dez	17 Mar	26 Jan	5 Oct	12 Jan	28 Jan	9 Apr	3 Jan	10 Jan	9 Jan	6 Jan
	8 Sep			18 Mar	29 Jan	6 Oct	17 Jan	30 Jan	10 Apr	3 Jan	11 Jan	10 Jan	8 Jan

Browse bbc.co.uk 10 years ago

Menu

Table

2008

February

15 February at 02:28

March

October

2009

2010

2011

January

May

July

1 July at 07:43

December

2012

2013

2014

2015

2016

ARQUIVO.PT

bbc.co.uk 1 July at 07:43, 2011

BBC Mobile


News Sport Weather Travel TV Radio More

Search the BBC


Top News story

'Doubts' over Strauss-Kahn case

The sex assault case against Dominique Strauss-Kahn appears to be in trouble amid reported concerns about the alleged victim's credibility.




News



Hu warns communists on corruption

President Hu Jintao warns China's communists that corruption could cost them the support of the people, as the party marks its 90th anniversary.



Chavez tells of cancerous tumour

Venezuelan President Hugo Chavez says he has had a second operation to remove a cancerous tumour, in his first televised speech since flying to Cuba for treatment.

Moroccans vote on king's reforms

US in CIA detainee death inquiry


Poland to take over EU presidency

Crowds welcome royals in Canada

Japan manufacturers 'pessimistic'

Spotlight

One in a Billion



China's haves and have-nots

It is officially a Communist country - but economic data points to a stark gap between rich and poor.

Building dreams: Dai Zhikang

From hawk to billionaire: Zhou Xiaoguang

China's top art collector: Liu Yiqian

Most Popular in News

Shared Read Watched/Listened

Meet the world's most powerful computer

Monaco Prince Albert to wed Olympic star

China celebrates longest sea bridge

Search **images** from the past

















Menu ARQUIVO.PT Options

Q Warsaw city Search


1996 1 Jan 2021 12 Nov

Pages Images Narrative Advanced search

About 4,550,586 results since 1996 until 2021

 → dentons.com/en/fin... 5 September 2019 at 11:06	 → epsmaps.com/search... 30 May 2010 at 05:50	 → warsawguide.com 18 May 2016 at 05:17	 → timeshighereducatio... 7 June 2019 at 02:28	 → epsmaps.com/Wars... 24 December 2009 at 17:32	 → timeshighereducatio... 9 December 2019 at 21:19	 → ilconservation.org/s... 13 May 2016 at 15:21	 → realpoland.eu/packa... 14 June 2017 at 00:31
 → ilconservation.org/s... 13 May 2016 at 15:22	 → vidiani.com/large-ro... 3 December 2019 at 11:49	 → nationsonline.org/o... 1 December 2019 at 00:35	 → vidiani.com/detailed... 3 December 2019 at 11:44	 → vidiani.com/large-de... 3 December 2019 at 11:45	 → lawyerpoland.eu/ho... 31 March 2019 at 03:22	 → 9flats.com/radmieci... 22 December 2019 at 11:11	 → cdn.neurope.eu/nati... 28 November 2014 at 01:46

ARQUIVO.PT



Visit Details

Image

Title:
Warsaw city centre

Alt text: Warsaw city centre

Caption: Poland's education system has seen some extraordinary changes in recent years. Following a huge drive in the nation's Katowice #6 1001+ Wrocław University of Science and Technology Wrocław Read mor...

URL:
timeshighereducation.com/sites/default/files/styles/the_breaking_news_image_style/public/warsaw_city_centre.jpg?tok=NYFWGvNj

Resolution: jpeg 620 x 413

Capture date: 7 June 2019 at 02:28

Page

Title:
Best universities in Poland | Times Higher Education (THE)

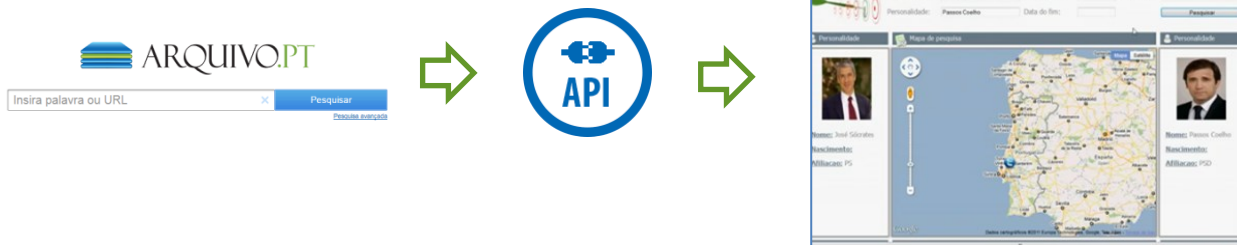
URL: timeshighereducation.com/student/best-universities/best-universities-poland

Capture date: 7 June 2019 at 02:28

How to provide access to support research over large-scale volumes of historical web data?

Four **A**pplication **P**rogramming **I**nterfaces to automatically search and access web-archived content

Your new app



Arquivo.pt APIs

APIs

Daniel Gomes edited this page 11 days ago · 33 revisions

APIs specific to Arquivo.pt that enable the full exploration of its functions

- [Arquivo.pt API \(Full-text & URL search\)](#)
- [Image Search API v1.1 \(beta version\)](#)

APIs based on international standards to enable interoperability among web archives and code reuse

- [CDX-server API \(URL search\)](#)
- [Memento API \(URL search\)](#)

arquivo.pt/api

🔗 Bulk download of web-archived resources

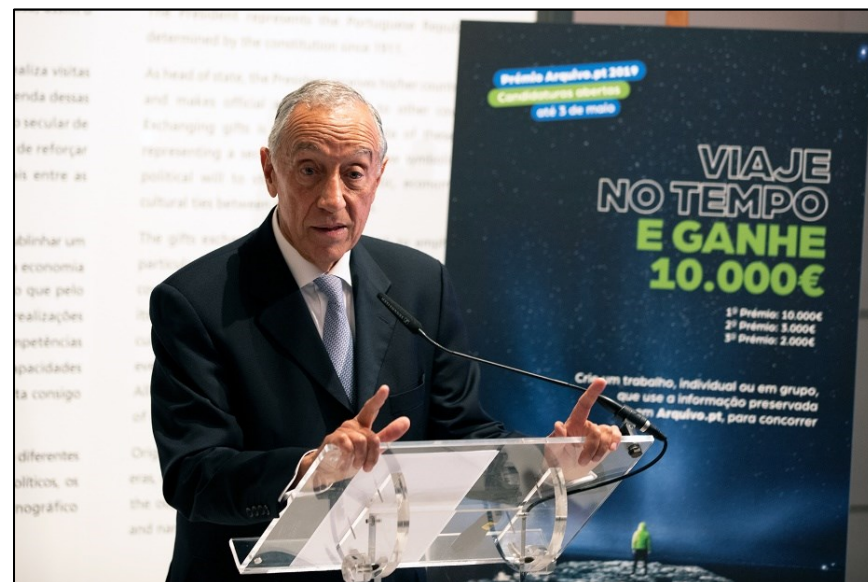
If you need to download a large amount of web-archived resources, such as all the URLs archived from a large website along time, we suggest the following methodology:

1. Analyse the [Arquivo.pt collections](#) so that you may choose those which may contain the most interesting web-archived data for your use case. If you have any doubt, [contact us](#).
2. Download the [CDXJ index files](#), ([what is CDXJ?](#)) of the [Arquivo.pt collections](#) you selected to process. For this purpose, analyse the "column A: Collection ID" and the corresponding CDXJ index files on "column H: Collection CDXJ File");
3. Create a list of selected URLs to be downloaded, extracted from the CDXJ index files (e.g. using Linux grep command);
4. Download the web-archived resources for the list of selected URLs from Arquivo.pt by using the above APIs or, by building links to directly access the web-archived resources. These links are available on the Technical details of the Options top-right menu when accessing a [web-archived page](#). For instance, for the URL <http://publico.pt/> with timestamp 20120201160355 extracted from the CDXJ index file, build the following links to download the:
 - original file of the web-archived page (loses replay quality because the original internal links are **not rewritten** to reference web-archived images or stylesheets): https://arquivo.pt/noFrame/replay/20120201160355id_/http://publico.pt/
 - web-archived page without the Arquivo.pt UI frame (internal links are rewritten to reference web-archived resources): <https://arquivo.pt/noFrame/replay/20120201160355/http://publico.pt/>

arquivo.pt/api#bulk

Examples of works performed over governmental web data

Arquivo.pt **Annual** Awards



Support of the President of the Republic of Portugal

➤ arquivo.pt/awards

[Arquivo-parlamento.pt](https://arquivo-parlamento.pt): Winner 2023 “Parliament Archive”

Web application for researching news and opinion articles preserved by Arquivo.pt about the Parliament’s activities across time

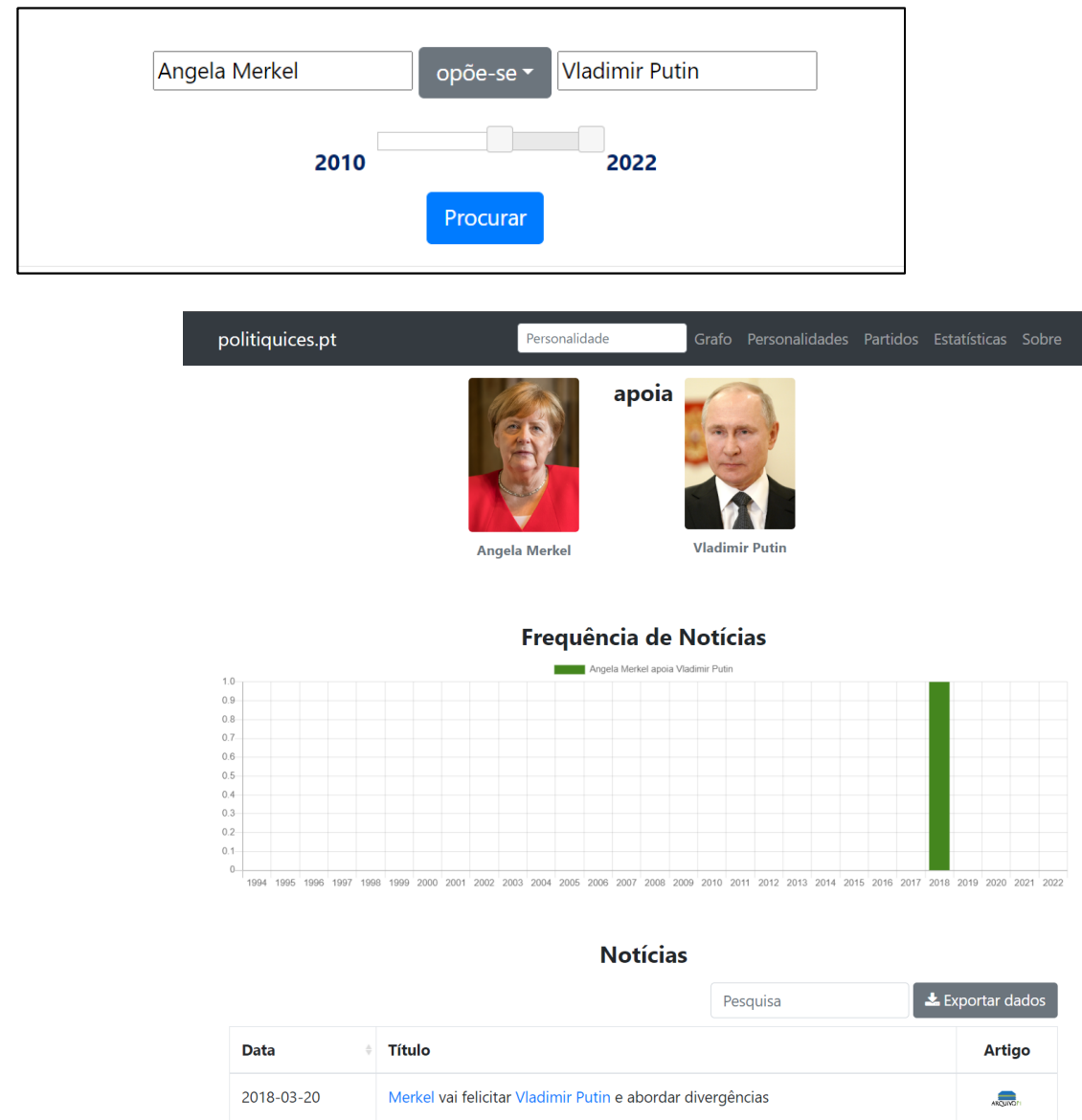
- Combined web-archived information with Parliament’s official open datasets.



Politiquices.pt

Web application for researching support or opposition relations between political personalities and parties expressed in news headlines across time.

- Web-archived news that document the relation are presented.



Learn more

Attend Training courses about web preservation and research

New ways of searching the past (module A)

- Any Internet user

Publish preservable information on the web (B)

- Web authors

Automatic processing of information preserved from the Web (C)

- Developers, Researchers

Do-it-yourself web archiving (D)

- Researchers, Librarians, Archivists

Videos in English also available!

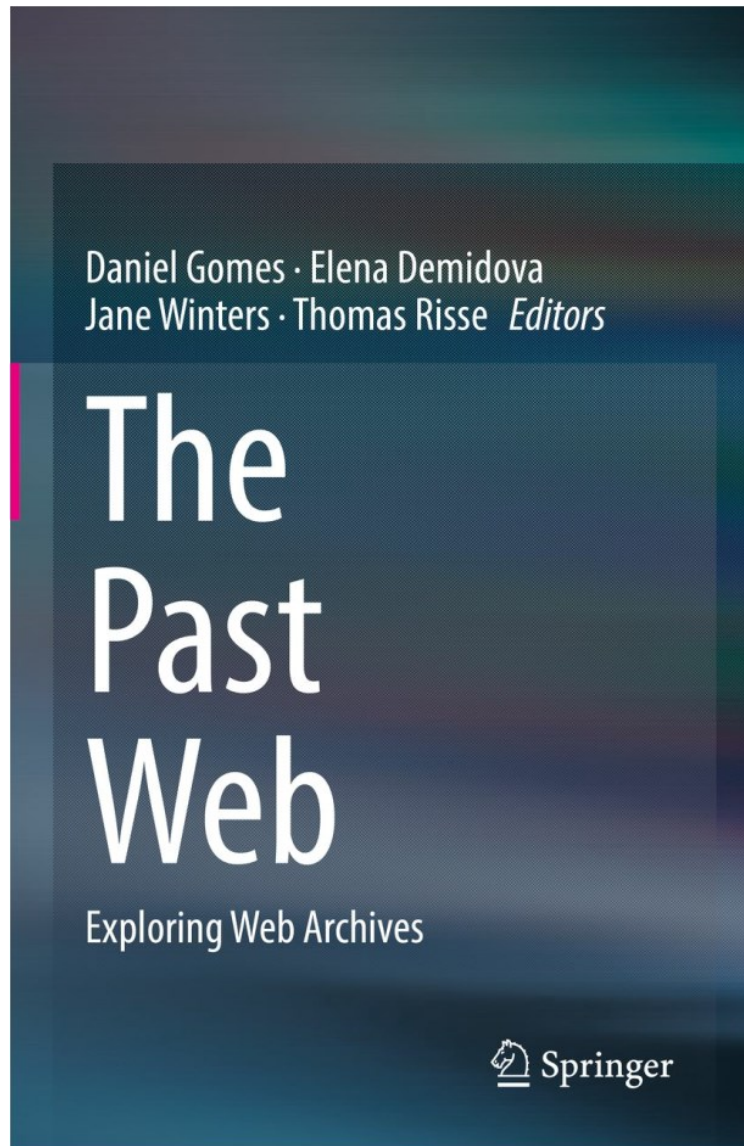


arquivo.pt/training

Suggested publications

- Web archives as research infrastructure for digital societies: the case study of Arquivo.pt (2022), Daniel Gomes
 - The Anatomy of a Web Archive Image Search Engine (2022), André Mourão
 - Information Search in Web Archives (2014), Miguel Costa
 - Learning Temporal-Dependent Ranking Models (2014), Costa et al.
- arquivo.pt/publications

Read this book 😊



Preprint version available in
open access at:
arquivo.pt/book

Keep in touch!

Subscribe our channels:

- arquivo.pt/subscribe: mailing list in English
- arquivo.pt/news: social networks and videos