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# Bellingcat's Digital Toolkit

Open Source Verification and Investigation Tools and Methods

Welcome to Bellingcat's openly and freely available digital list of tools and methods we use for verification and open source research. You can follow our work on our website, Twitter and Facebook. **Feel free to suggest tools not yet listed here!** This is version 3.3 (March 26, 2018).



A condensed version of the digital toolkit accessible for anyone with an internet connection, made by H I Sutton, Aliaume Leroy, and Tony Roper. Download here in higher resolution.

The list includes satellite and mapping services, tools for verifying photos and videos, websites to archive hyperlinks, and much more. The list is long, and may seem daunting. There are guides at the end of the document, highlighting the methods and use of these tools in further detail. We also provide tailored digital forensics workshops.

Currently, I'm trying to find a better way to thematically structure this list and I'm working on a more extensive guide with simple case-studies to the tools we use most. This will be an openly available and digital guide in English and hopefully Arabic too. I will share a link here once it is published. Feel free to contact me with questions or suggestions via email (christiaantriebert@bellingcat.com) or Twitter (@trbrtc).

## Maps, Satellites & Streetview

| Name | Description | Pros | Cons | Link |
|---|---|---|---|---|
| **Bing Maps** | Microsoft satellite and mapping service. | More recent and higher resolution imagery than Google, e.g. in Afghanistan and Iraq. | Difficult to check the date of the imagery (this tool doesn't work anymore) | bing.com/maps |
| **converting coordinates** | Convert geographic coordinates between | | | synnatschke.de/geo-tools/coordinate-converter.php |

| | | | |
|---|---|---|---|
| | vendor. | the catalogus, search tool very easy to use. | |
| **DualMaps** | Combines Google's road maps, aerial view, and street view in one embeddable tool. | | | data.mashedworld.com/dualmaps/map.htm |
| **EarthExplorer** | | | | earthexplorer.usgs.gov |
| **find2places** | Allows querying Google Maps API for two specific places in precise distance from each other within given radius. Useful for geolocating photos and videos. | | It's a script, no user-friendly interface. | github.com/musafir-py/find2places |
| **Geograph** | Georeferenced images. | | | geograph.org |
| **GeoNames** | Database of location names. | Wide variety of different spellings in various languages. | | geonames.org |
| **Google Earth Pro** | | Add a Bing Maps satellite imagery layer. Historical imagery. | | [software] Training guides here. |
| **Google Earth Engine** | Open-access satellite imagery and analytical framework | Virtually any satellite imagery collected from NASA, NOAA, USGS, etc. is available | Moderate and coarse resolution imagery rather than high-resolution commercial imagery; Learning curve with Javascript | https://earthengine.google.com/ |
| **Google Maps** | | StreetView, many large cities in U.S., Europe, modelled in 3D. | No historical satellite imagery, but historic streetview images available in many places. | maps.google.com |
| **Google Photos** (formerly Panoramio) | | | | |
| **HERE WeGo** | | More recent satellite imagery than Google in e.g. Iraq. | | wego.here.com |
| **Mapchecking** | Calculate amount of people that are standing in selected Google Maps area. | | | mapchecking.com |
| **Mapillary** | Crowdsourced street level photos. | Useful addition to Google Streetview. | Little to no coverage in countries like Syria, Iraq, etc. | mapillary.com |
| **OpenStreetCam** | | | | openstreetcam.org |
| **OpenStreetMap** | | | | openstreetmap.org |
| **Radiant Earth** | | | | radiant.earth |

| | | Ability to explore a variety of GIS variables eg NDVI or NDWO. | | |
|---|---|---|---|---|
| **TerraServer** | Satellite imagery vendor. | Highest resolution available (0.3m). | $ to preview high-resolution satellite imagery. | terraserver.com |
| **Wikimapia** | Crowdsourced information related to geographic locations. | Possibility to switch between Google/Bing/OSM. Massive amount of UCG information. | Can be laggy, and need to refresh page after a view searches. | wikimapia.org |
| **Yandex Maps** | | | | yandex.com/maps |

| | **Geobased Searches** | | | |
|---|---|---|---|---|
| **Name** | **Description** | **Pros** | **Cons** | **Link** |
| **Echosec** | Geobased searches. | Twitter, VKontakte, Foursquare | $ (doesn't list Facebook, genuine Instagram) | echosec.net |
| **Liveuamap** | Interactive live map of conflict news. | Variety of countries available: Afghanistan, Iraq, Syria, U.S., Ukraine, Venezuela, etc. | | liveuamap.com |
| **Photo-Map.RU** | Geotagged VKontakte posts. | VKontakte | | photo-map.ru |
| **SnRadar** | Geotagged VKontake posts. | VKontakte | | snradar.azurewebsites.net/search |
| **Twitter** | Insert in search box: geocode: [coordinates],[radius-km], for example: geocode:36.222285,43.998233,2km (only works with km, so 500m = 0.5km) | There's a tool for it too. | Easy to fake. | |
| **WarWire** | Geobased searches. | Twitter, VKontakte, Instagram | $ (but does list Instagram) | warwire.net |
| **YouTube** | Geobased searches | | Unclear whether it shows where it was uploaded, from which server, or only filters on keywords (e.g. "Paris" in title  shows up in Paris). | youtube.github.io/geo-search-tool/search.html |

| | **Images, Videos and Metadata** | | | | |
|---|---|---|---|---|---|
| **Name** | **Description** | **Pros** | **Cons** | **Link** | **Guides** |
| **Amnesty YouTube Dataviewer** | Reverse image (video still) search | | Searches for a number of still, not each frame | amnestyusa.org/sites/default/custom-scripts/citizenevidence | Advanced Guide on Verifying Video Content |

# Bellingcat's Digital Toolkit

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|---|---|---|---|---|---|
| **Exiftool** | Read and manipulate metadata for a vast number of file types. Note: no GUI | Floss, Cross platform and very easy to integrate in scripts. | Yet to encounter any (Have only used on GNU/Linux). | https://www.sno.phy.queensu.ca/~phil/exiftool/ | See forum and FAQ on link page |
| **Foca** | Extracts metadata. | Windows based, open sourced 2017. | No native linux support. (needs wine installed within linux) | elevenpaths.com/labstools/foca/index.html | NullByte |
| **FotoForensics** | Image forensics tool. | Simple, web based. | Public access, information not private. | fotoforensics.com | |
| **GooFile** | Extract metadata. | Simple to use. | Doesn't work well outside Kali | tools.kali.org/information-gathering/goofile | Ascii cinema |
| **Image Forensics** | Web based image forensics tool. | Can easily identify fake or doctored images | Public access, information not private. | 29a.ch/photo-forensics/#level-sweep | |
| **InVID** | Verification plugin to help journalists verify images and videos. Contextual data, Metadata, reverse search (Google, Yandex, Baidu), image forensic, Magnifie)r | | | invid-project.eu (plugins for Chrome, Firefox (Windows, Mac OS X, Linux) | https://www.youtube.com/w v=nmgbFODPiBY |
| **Irfanview** | Extract metadata. | Windows based | No native linux support | irfanview.com | |
| **Jeffrey's Image Metadata Viewer** | Extract metadata, online. | Only requires web browser. | Public access, information not private. | exif.regex.info/exif.cgi | |
| **Reveal Image Verification Assistant** | Forensic providing eight filters to detect still images alterations. | Web-based image tool. Also available within InVID verification plugin. | | http://reveal-mklab.iti.gr/reveal/index.html | Documented with examples explanations of the differen filters. Developed in Reveal project. |
| **reverse image search** | Locates similar images on the internet | Easy, simple and works! | Recommended plugin: RevEye, which searches Google, Yandex, Baidu and Bing. | https://www.tineye.com/ | |
| **SpiderPig** | Extract metadata. | Command line interface and scriptable. | Requires dependencies and knowledge of web technologies. | github.com/hatlord/Spiderpig | |

## Social Media

### Facebook

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| **Graph.tips** | Automatically advanced searches for Facebook profiles. | | | graph.tips/beta | |
| **Who posted what?** | Find posts on Facebook | | | whopostedwhat.com | |
| **IntelTechniques** | Various tools for analyzing Facebook profiles and pages. | | | inteltechniques.com/menu.html | |
| **Facebook livemap** | Live broadcasts around the world. | | | facebook.com/livemap | |
| **Search Tool** | Find accounts by name, email, screen name, and phone. | | | netbootcamp.org/facebook.html | |
| **StalkScan** | Automatic advanced searches per Facebook profile. | | | stalkscan.com | |
| **Video Downloader Online** | Download Facebook videos. | | | fbdown.net | |
| **Skopenow** | Social Media Investigations - name, phone, email, username searches. | | | Skopenow.com | |

### Instagram

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| **Websta** | Find other locations in Instagram's database near a particular location. | | | websta.me | Use direct URL with a ID, e.g. websta.me/location/1 |

### LinkedIn

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| **Socilab** | Visualise and analyse your own LinkedIn network. | | | sociliab.com | |

### Snapchat

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| **Snap Map** | Searchable map of geotagged snaps. | | | map.snapchat.com | |

### Tumblr

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| **Tumblr Originals** | Find original posts per Tumblr, thus excluding reblogs. | | | studiomoh.com/fun/tumblr_originals | |

### Twitter

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| **InVID verification plugin** | InVID plugin provides a Twitter advanced search by time interval up | Allows to document | | InVID verification plugin | Automates the conve between calendar da |

| Name | Description | Pros | Cons | Link | Guides |
|------|-------------|------|------|------|--------|
| | | | without APIs and time limit. Allows to search for content within a user-defined time range after a breaking news. | | |
| **Onemilliontweetmap** | Tweets map per locations up to 6 hours old, keyword search option. | | | [onemilliontweetmap.com](onemilliontweetmap.com) | |
| **Treeverse** | Chrome extension to visualise Twitter conversations. | | | [t.co/hGvska63Li](t.co/hGvska63Li) | |
| **Tweetreach** | Find reach of tweets. | | Advanced search operators available, same as Google advanced search. | [tweetreach.com](tweetreach.com) | |
| **Twitter advanced search** | Search by date, keywords, etc. | | | [twitter.com/search-advanced](twitter.com/search-advanced) | |
| **Twitter geobased search** | geocode:[coordinates],[radius-km], for example: geocode:36.222285,43.998233,2km | There's a tool for it too. | | | |
| **Twlets** | Download anyone's tweets, followers and likes in an Excel sheet. | Easy and quick to use, there's a Chrome extension too. | Goes up to 3,200 tweets, followers and likes. | [twlets.com](twlets.com) | |
| **quarter tweets** | Geobased Twitter search. | | | [qtrtweets.com/twitter](qtrtweets.com/twitter)[a] | |

| YouTube | | | | | |
|---------|--|--|--|--|--|
| **Name** | **Description** | **Pros** | **Cons** | **Link** | **Guides** |
| **Amnesty YouTube Dataviewer** | Reverse image (video still) search and exact uploading time. | | Searches for a number of still, not each frame is included (thus results may be left out). | [amnestyusa.org/sites/default/custom-scripts/citizenevidence](amnestyusa.org/sites/default/custom-scripts/citizenevidence) | [Advanced Guide on Verifying Vi Content](#) |
| **Geo Search Tool** | Search for YouTube videos based on location. | | | [youtube.github.io/geo-search-tool/search.html](youtube.github.io/geo-search-tool/search.html) | |

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| Air | | | | | |
|---|---|---|---|---|---|
| **Name** | **Description** | **Pros** | **Cons** | **Link** | **Guides** |
| **AirNav RadarBox** | Tracking flights, including private and military jets. | | | radarbox24.com | |
| **ADS-B Exchange Global Radar** | Tracking flights. | Includes a number of military aircraft. | | global.adsbexchange.com/VirtualRadar/desktop.html | |
| **FlightAware** | | | | flightaware.com | |
| **FlightRadar24** | Tracking (civilian) flights. | | $ to go back in 12 month archive. | flightradar24.com | |
| **PlaneFinder** | | | | planefinder.net | |
| Marine | | | | | |
| **MarineTraffic** | | | | marinetraffic.com | |
| **VesselFinder** | | | | vesselfinder.com | |
| Railway | | | | | |
| **Trains** | Full interactive maps of various railway networks in European countries. | | | Denmark, France, Germany, Netherlands | |
| Misc | | | | | |
| **WikiRoutes** | Public transport database. | | | wikiroutes.info | |

| Date & Time | | | | | |
|---|---|---|---|---|---|
| **Name** | **Description** | **Pros** | **Cons** | **Link** | **Guides** |
| **SunCalc** | Make approximation of time of the day using shadow direction. | | | suncalc.net / suncalc.org | |
| **Wolfram\|Alpha** | Does a load of things, including **weather forecasts** per day and location. | | | wolframalpha.com | |

| Individuals, WhoIs, IPs, Website Analysis[b] | | | | | |
|---|---|---|---|---|---|
| **Name** | **Description** | **Pros** | **Cons** | **Link** | **Guides** |
| **Passive DNS** | Collects, stores and analyses data from thousands of | Complete unadulterated historical and | 15 API calls day, 15 web based searches a day. | community.riskiq.com | |

| | | | | domaintools.com | |
|---|---|---|---|---|---|
| | monitors every reachable server and device on the Internet. | knowledge of internet connected devices. | | | |
| **Domain Tools** | | | | domaintools.com | |
| **DNS History** | Collection of historical DNS information. | Free, simple and easy to use. | Sometimes limited in availability. | DNS History | |
| **DNS cyrillic check** | Check if malicious or cyrillic domains are registered | Free, simple and easy to use. | | https://holdintegrity.com/checker | |
| **DNS Trails** | The World's Largest Repository of historical DNS data | Free, simple and easy to use. | | dnstrails.com | |
| **Geo IP Tool** | Check your own IP, handy to check if your VPN is working, | | | geoiptool.com | |
| **Shodan** | Internet of things search engine. | Can find heaps of misconfigured network connected devices. | Lives in the grayzone... | shodan.io | |

- **IXMaps**, IXMaps

- Network-Tools

- Open Site Explorer

- **People search**

    ○ **Peekyou**, peekyou.com

    ○ **Pipl**, the world largest people search engine, find persons behind an e-mail address, social media username, or phone number, pipl.com

    ○ **Yasni**, yasni.com

    ○ **Zaba Search**, only US, zabasearch.com

    ○ publicrecords.searchsystems.net

    ○ cemetery.canadagenweb.org/search.html

    ○ opencorporates.com

- Robtex

- Search IRC

- Shodan Computer Search

- Utrace

- ViewDNS

- **DNS Historical Data**, research.dnstrails.com

## Archiving, Downloading & Internet Storage

| Name | Description | Pros | Cons | Link | Guides |
|---|---|---|---|---|---|
| **Archive.is** | Let's you archive any webpage. | | | Archive.is | |
| **DMCA** | Search takedown notices | | | lumendatabase.org | |
| **Gruber** | Slideshare downloader | | | http://grub.cballenar.me/ | |
| **Historic Breach Database List** | | | | https://publicdbhost.dmca.gripe/random/ | |
| **Wayback Machine** | Archives websites. Download an entire website from the Wayback Machine. | | | github.com/hartator/wayback-machine-downloader | |

## Miscellaneous

| Name | Description | Pros | Cons | Link | Guides |
|---|---|---|---|---|---|
| **BlockExplorer** | Following a bitcoin trail or following a bitcoin account ? | | | https://blockexplorer.com | |
| **Check** | Collaborative fact-checking. | | | checkmedia.org | User guide, Bellingcat's Check team |
| **Document Redaction** | Useful for removing potentially harmful content in Pdfs before viewing, like traceback. | | | github.com/firstlookmedia/pdf-redact-tools | |
| **Google Search Operators** | Such as searching for a specific filetype (e.g. PDF) or on a specific website. | | | googleguide.com/advanced_operators_reference.html | |
| **Hunch.ly** | Research sidekick. | | $$$ | hunch.ly | |
| **Insecam** | Network live IP video cameras directory. | | | insecam.org/en/ | |
| **LittleSis** | Database of who-knows-who at the heights of | | | littlesis.org | |

| | | | | | |
|---|---|---|---|---|---|
| | analyses legal complaints and requests for removal of online materials, helping Internet users to know their rights and understand the law. These data enables us to study the prevalence of legal threats and let Internet users see the source of content removals. | | | | |
| **Maltego** | Interactive data mining tool that renders directed graphs for link analysis. | Used in online investigations for finding relationships between pieces of information from various sources located on the Internet. | $$$ | paterva.com/web7 | |
| **Montage** | For collaborative working. | | | montage.storyful.com | |
| **Malicious URL Tester** | Testing unknown URLS | | | safeweb.norton.com | |
| **OpenCorporates** | Database of companies in the world. | | | | |
| **Tor Site Searcher** | Search hidden tor sites via clearnet[c][d]. | | | oint.ctrlbox.com | |
| **People tracer** | | | Site will be closed in March 2018. | peopletracer.co.uk | |
| **TimelineJS by Knight Lab** | Make an interactive timeline of events. | | | timeline.knightlab.com | |
| **Unknown Hash ID** | On investigation if you come across a hash but don't know what it is (and warrants further investigation) this will identify the type. | | | onlinehashcrack.com/hash-identification.php | |
| **Visual** | | | | vis.occrp.org | |

| | | | | | |
|---|---|---|---|---|---|
| | property with the UK's leading resource. Browse houses and flats for sale and to rent, and find estate agents in any area. | | | | |

## Guides & Handbooks

● **American Press Institute Fact-Checking Resources**, americanpressinstitute.org/training-tools/fact-checking-resource

● **Bellingcat's resources**, www.bellingcat.com/category/resources/how-tos, for example:

● **Exposing the Invisible**, a project by the Tactical Tech Collective,  exposingtheinvisible.org

  ○ Includes multiple guides (website data scraping, Google Dorking etc.), resource links, and examples of successful investigations in various fields

● **First Draft News**' resources, some of which have been written by Bellingcat members, firstdraftnews.com/resources, for example:

  ○ How to Get Started in Online Investigations

● **Flash Environmental Assessment Tool,** for identifying harmful substances and their effect on the environment after industry has been destroyed: https://docs.unocha.org/sites/dms/Documents/FEAT_Version_1.1.pdf

● **Poynter**, fact-checking how-to guides, factcheckingday.com/#how-to

● **Poynter**, fact-checker's code of principles, poynter.org/fact-checkers-code-of-principles

● **Verification Handbook** (PDF) is a great place to go to find tools to verify digital information, verificationhandbook.com

● **Washington Post**, fact-checker's guide, washingtonpost.com/news/fact-checker

● **Washington Post**, fact-checker tool, washingtonpost.com/news/fact-checker

● **WITNESS**

  ○ Activists' Guide to Archiving Video

  ○ Video As Evidence: Verifying Eyewitness Video

WEAPONS

● Open guide called "**Itrace**" by Conflict Armament Research, lots of information on different kinds of munitions and weapons presented graphically on a map format, itrace.conflictarm.com

## Data Visualisation

| Name | Description | Pros | Cons | Link | Guides |
|---|---|---|---|---|---|
| **DataBasic.io** | Web tools for | | | databasic.io/en | |

| Name | Description | | | Links | |
|---|---|---|---|---|---|
| **DataWrapper** | Easy to use chart and mapping tool | | | datawrapper.de | |
| **Google Fusion Tables** | | | | fusiontables.google.com | |
| **Maptia** | | | | maptia.com | |
| **Visual investigative scenarios** | | | | vis.occrp.org | |
| **RAWGraphs** | Free webtool to quickly visualize your data | | | app.rawgraphs.io | |
| **Open Desktop Semantic Search** | | Searches unstructured data well | | opensemanticsearch.org/doc/desktop_search | |
| **TrustServista** | Online story verification and visualisation tool | | | www.trustservista.com | |
| **Neo4j** | Graph Platform | | | neo4j.com | |

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## Online Security & Privacy

● Check for every digital service you use whether you have enabled **two factor authentication (2FA)**, twofactorauth.org

● Security in a box guide: https://securityinabox.org/en/

● **Tech Solidarity**, techsolidarity.org

○ Basic Security Guide, do and don'ts for basic security when using a laptop and/or mobile device, techsolidarity.org/resources/basic_security.htm

SEARCH ENGINES WHICH PROTECT PRIVACY

● **DuckDuckGo**, Internet search engine, protecting privacy, duckduckgo.com

● **StartPage**, Internet search engine, protecting privacy, startpage.com

● **Qwant**, Internet search engine, protecting privacy, qwant.com

| Sources per Country | | | | |
|---|---|---|---|---|
| Iraq | | | | |
| Name | Description | Pros | Cons | Links |
| **Provinces of the so-called Islamic State** | | | | umap.openstreetmap.fr |
| Syria | | | | |
| Name | Description | Pros | Cons | Links |

| | | | | |
|---|---|---|---|---|
| | compiled by Noor Nahas of multimedia sources from Syrian opposition groups, | | | |
| **Provinces of the so-called Islamic State**, | | | | umap.openstreetmap.fr |

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### Company Registries

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● **French SIRENE**, provided by Investigative Dashboard, a queryable version of the french RCS (Business registry), with OpenRefine reconciliation tool. https://data.occrp.org/entities?filter:dataset=fr_sirene

● **Business registries in Europe**, on the European e-Justice portal, links to the national business registry of each EU member. https://e-justice.europa.eu/content_business_registers_in_member_states-106-en.do

● Portugal, https://publicacoes.mj.pt/DetalhePublicacao.aspx

https://challenge.burnerapp.com/

### Expert/Source Tools

| Name | Description | Pros | Cons | Link | Guides |
|---|---|---|---|---|---|
| **Expertise Finder** | Search engine for journalists to find experts (currently only academics in USA and Canada), contact information on page, no login, 30k experts listed | | | http://expertisefinder.com/ | |
| **Expert Guide** | Academics open to media in Australia: | | Australia only. | http://www.expertguide.com.au/ | |
| **Help a Reporter Out** | Post a query and experts reply, mainly USA and Canada, quality of replies is hit or miss | | | https://www.helpareporter.com/ | |
| **She Source** | Female experts, mainly USA. | | | http://www.womensmediacenter.com/shesource/ | |
| **Speakezee** | Academics and those with PhDs, mainly UK: | | | https://www.speakezee.org | |

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- https://www.numberway.com/ -  a list of urls to local White Pages and Yellow Pages, with description in English. Useful in finding people and companies (I've already placed it in the google doc)

- https://socialbearing.com/ - lots of Twitter statistics (mostely useful or comparative materials/reports).

Paint.net

Namechk.com

Very good for identifying online accounts with a username. Simply plug the username in and this tool will identify where there are users using that name.

| |
|---|
| [a]is anyone able to tell me how confidently we can use this? not able to find a lot of info from the developers. would appreciate a chat with someone familiar with it |
| [b]maybe borrow from this table for this section which covers a lot of this same ground https://docs.google.com/spreadsheets/d/18U1qcaPaqIF8ERVLI-g5Or3gUbv0qP_-JUtc0pbEs0E/edit#gid=0 |
| [c]I think someone needs to dedup some of these entries |
| [d]Good one, will anyway clean up this specific list. Thanks! |