Verifying Videos and Images





Aric Toler, Bellingcat



- Key questions in video/image verification
 a) Where?
 - b) When?
 - c) Who?
 - d) Why?
- 2) Metadata and digital forensics
- 3) Think like a faker

Key questions in image/video verification:

1) Where?

Determine through geolocation

2) When?

Determine (if possible) through shadows, weather, temporary details, context

3) Who?

Determining first -- not most popular -- source

4) Why?

Determine motive



https://www.youtube.com/watch?v=0qyiGA4zIV4





A column of Russian armoured vehicles moves along a road in South Ossetia, near the border with North Ossetia August 23 2008.





Russian heavy armoured vehicles in the Ardon Valley , Russia, heading towards the Georgian border and South Ossetia on Saturday, Aug. 9, 2008. Russia sent hundreds of tanks and troops into the separatist province of South Ossetia and bombed Georgian towns Saturday in a major escalation of the conflict that has left scores of civilians dead and wounded. (AP Photo / Mikhail Metzel)



Example: Riyadh Missile Defense





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Houthi missile intercepted near #Riyadh

@BBCWorld @CNN #الرياض



7:05 AM - 19 Dec 2017

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https://yout u.be/EzZL **GEAh5CM**















Royal Saudi Strategic Missile Force - Wikipedia

https://en.wikipedia.org/wiki/Royal_Saudi_Strategic_Missile_Force >

... branch of the Royal Saudi Armed Forces, responsible for commissioning long-range strategic missiles. The RSSMF formerly had its headquarters in an underground command facility in Riyadh- the capital of Saudi Arabia. The facility coordinated Saudi Arabia's advanced "Peace Shield" radar and air defense systems.

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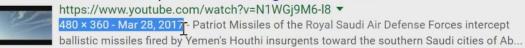
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Houthi missiles intercepted over Asir region - YouTube



Royal Saudi Air Defense - World News

https://wn.com/Royal Saudi Air Defense

Geolocation: Where was a photograph/video shot?

Determine the location of a photograph or video by finding identifiable features in a photographic/video, then match them to the same features in another photograph/video or satellite image.

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Source Material from YouTube, social media, etc...

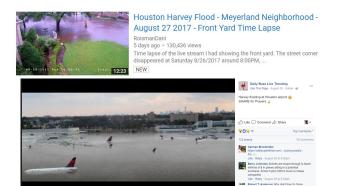


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Cross-reference materials for geolocation







Google Street View



Street-Level Imagery

- Google Street View (All over!)
- Bing Streetside (US, UK, France, Spain)
- Yandex Panorama (Russia/Former Soviet Union)
- MapJack (West Coast US, Sweden, Thailand...)
- Some countries and cities have specialized services

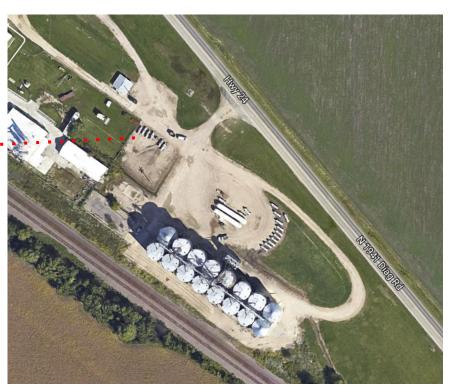
















rial Satellite imagery





(Free) Satellite Imagery

- Google Earth (historical imagery available)
- Google Maps (no historical imagery)
- Yandex Maps
- Bing Maps
- Wikimapia (combines multiple services)
- Terraserver (only previews are free)



Other Photo/Video



Geotagged Photos/Videos

- Google Earth (turn on "photos" option)
- Panoramio (shutting down soon, integrated into Google Earth)
- Yandex Maps (geotagged photos included)
- Echosec (\$\$\$, shows geotagged Instagram/VK/Twitter posts)
- YouTube (search street names for dash cams)

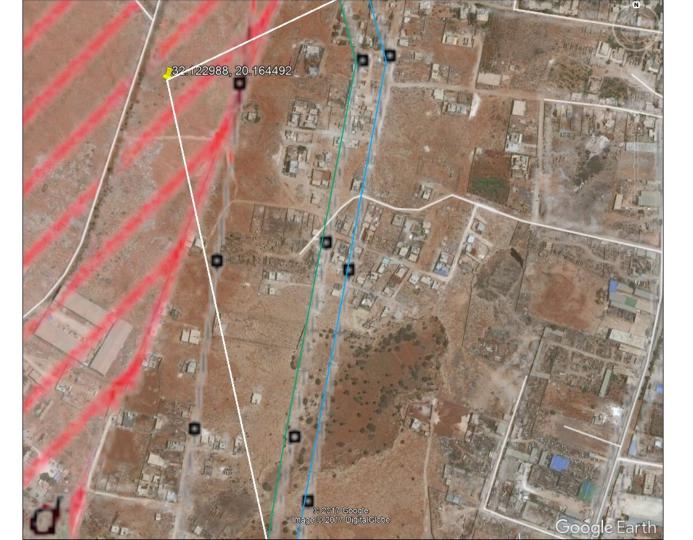












Why geolocate?

The International Criminal Court (ICC) issued an arrest warrant for a Libyan commander for unlawful executions and war crimes. This warrant was issued **entirely based off of evidence from social media**.

Not only does geolocating a video verify that the events really took place, it also solidifies evidence that can be used in criminal investigations. The ICC was not able to geolocate this video on their own, but a crowdsourcing campaign ran by Bellingcat provided coordinates for the video -- proving that it really did take place. The video was filmed at a military compound controlled by this Libyan commander, in between Benghazi and its airport.

"Temporal Location"

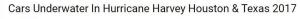
When was a photograph/video shot?

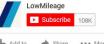
Determine the date/general time of a photograph or video by finding time-specific details, such as weather or temporary features (e.g. billboards), or determine a more precise time* by analyzing visible shadows.

Will likely not give you 100% verification, but will let you quickly sniff out fakes.

*Exact location and approximate date needed







48,263 views

Published on Sep 2, 2017

Catastrophic flooding at a historic level was the result of Hurricane Harvey.

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Houston flooding: At least 5 dead - CNN - CNN.com



www.cnn.com/2016/04/18/us/houston-texas-flooding/index.html ▼ 1600 × 900 - Apr 18, 2016 - More than a foot of rain in some places **flooded** low-lying areas across the **Houston** ... "**Houston** residents should avoid travel at all costs **today**.

Tropical storm Harvey brings deadly floods to Houston - YouTube



https://www.youtube.com/watch?v=b7qESUrBtk0 ▼

168 × 94 - Aug 27, 2017 - Tropical storm Harvey has unleashed catastrophic flooding in Houston, the largest city in the US state of Texas, turning streets into raging rivers ...

Houston Flooding Is Deadly as Harvey Lingers - YouTube



https://www.youtube.com/watch?v=mAL08g3Sycg ▼
168 × 94 - Aug 27, 2017 - Once a hurricane Harvey, now a tropical storm, pummeled **Houston** and the surrounding region, bringing catastrophic **flooding** and killing at ...

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jalopnik.com/watch-this-annoyed-reporter-rescue-a-man-from-a-sinking-1... ▼ 1870 × 1161 - Apr 18, 2016 - KTRK **Houston's** news reporter Steve Campion was live on the scene covering **flooding** going on in the area, when he saw two cars drive ...

VIDEO: Houston Reporter Jumps Into Flood Water To Save Driver



https://weather.com/.../houston-reporter-jumps-into-flood-water-to-save-driv... 980 × 551 - Apr 19, 2016 - A KTRK reporter out of **Houston** Texas jumped into the **flood** waters to help pull a driver to safety before his car got submerged.

Watch This Annoyed Reporter Rescue A Man From A Sinking Car On Live TV









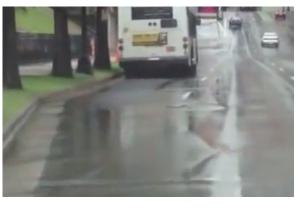






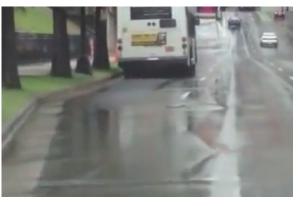












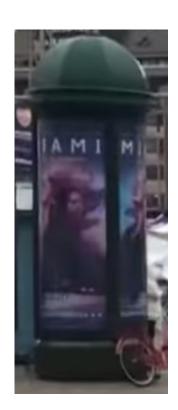
















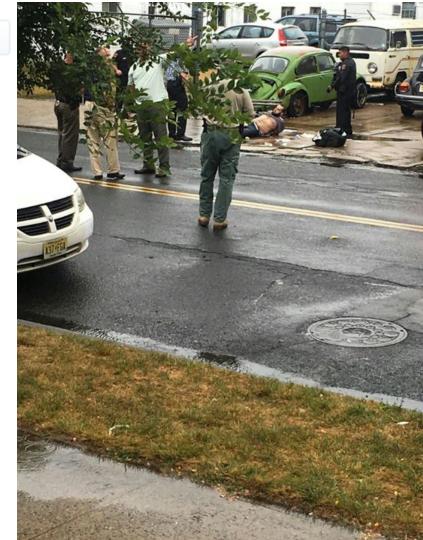




Ahmed Khan Rahami, bombing suspect, shot in Linden, NJ

Supposed eye witness to arrest of Manhattan / New Jersey bombing suspect -- other than geolocation, how do we verify that this image could be real?

Arrested on September 19, 2016





Recorded weather for Linden, New Jersey:

time range day of Monday, September 19, 2016

temperature (71 to 77) °F (average: 73 °F)

conditions rain, thunderstorm, overcast, cloudy

relative humidity (80 to 94)% (average: 87%)

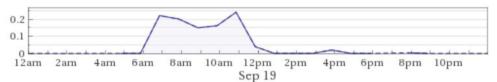
wind speed (0 to 11) mph (average: 5 mph)

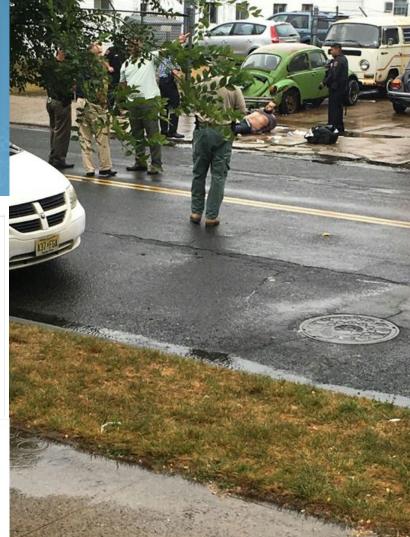
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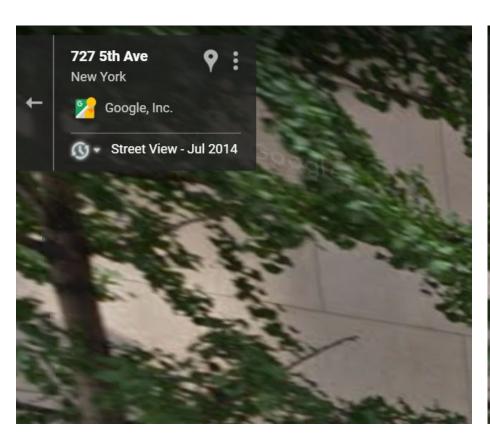
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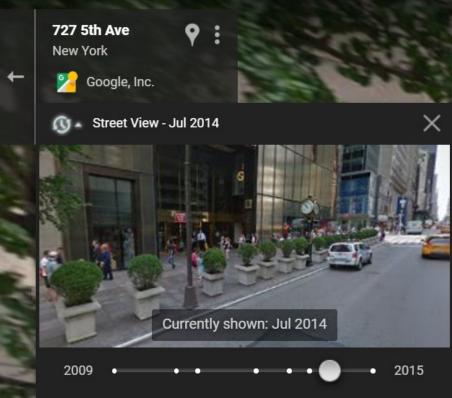
Precipitation rate:

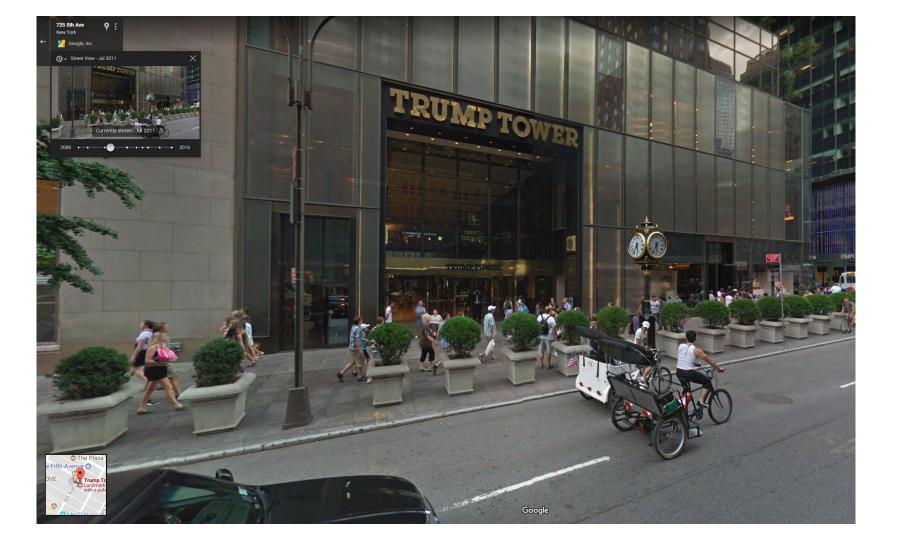


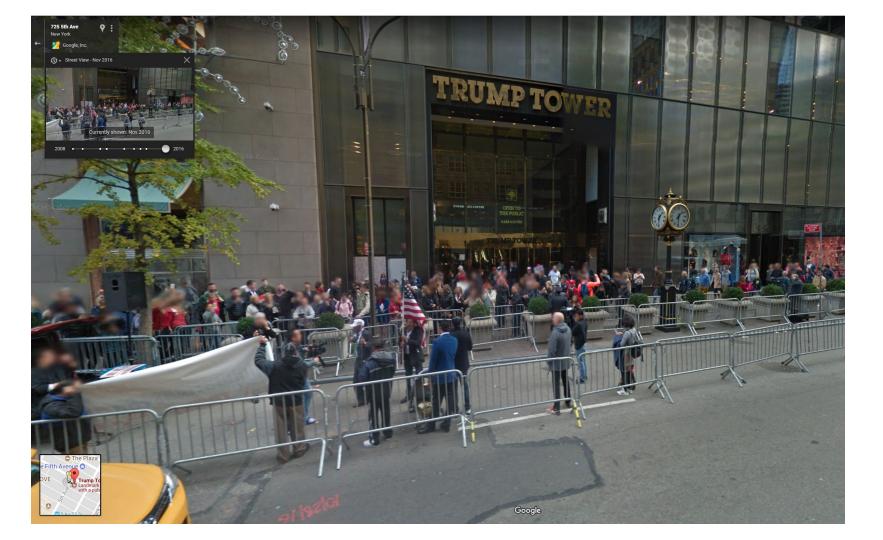


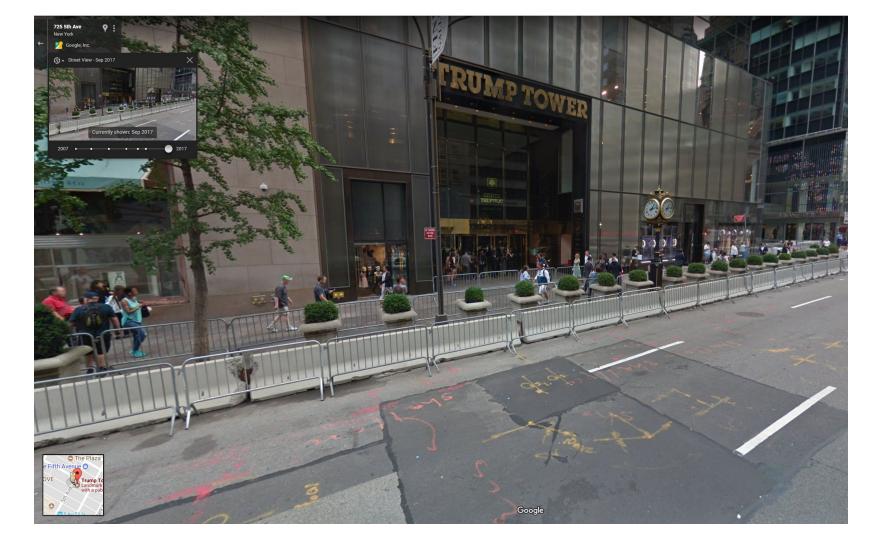
Timeline













George Papadopoulos

@GeorgePapa19

Former advisor to President Trump and Secretary of Housing and Urban Development, Dr. Ben Carson. University College London grad. Energy advisor



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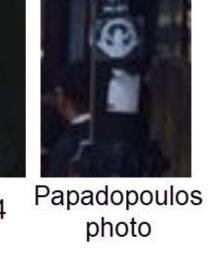








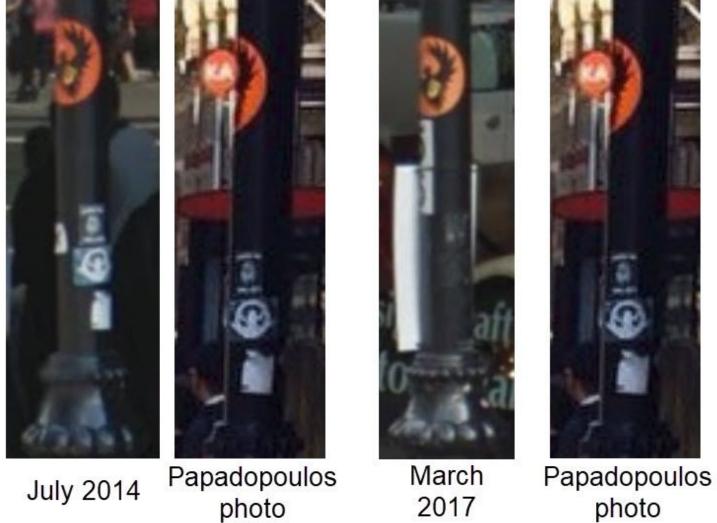




July 2014



photo



Digital Sundials

Using shadows to determine a specific time

If you know **exactly** where a photograph or video was taken, the approximate date, and there are clear shadows visible, you can often determine the approximate time of the source material.

Use Suncalc.org to place the shadow visible in photograph/video, and then adjust to match source material.

Don't forget to adjust for time zones!

Reported skirmish between Indian and Chinese soldiers at a lake.

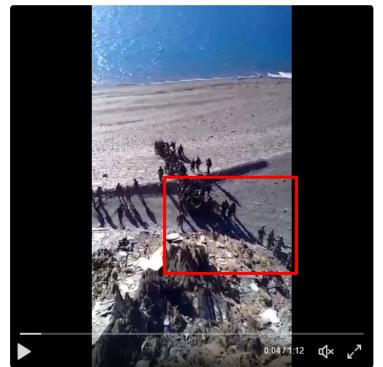
Alleged time: August 15, 7:30am

Shadows seem to be perpendicular to the shore, visible paths





#FirstOnThePrint Video of Indian & Chinese soldiers clashing at Pangong lake in Ladakh on August 15. @manupubby



7:38 AM - 19 Aug 2017



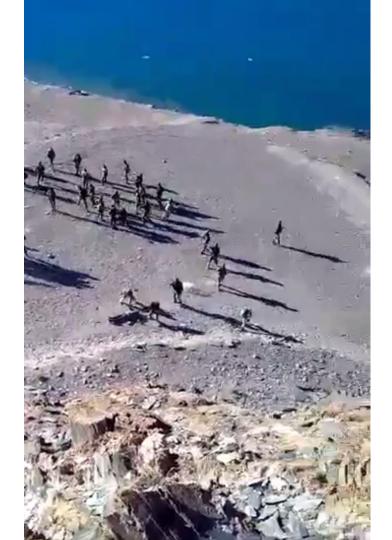


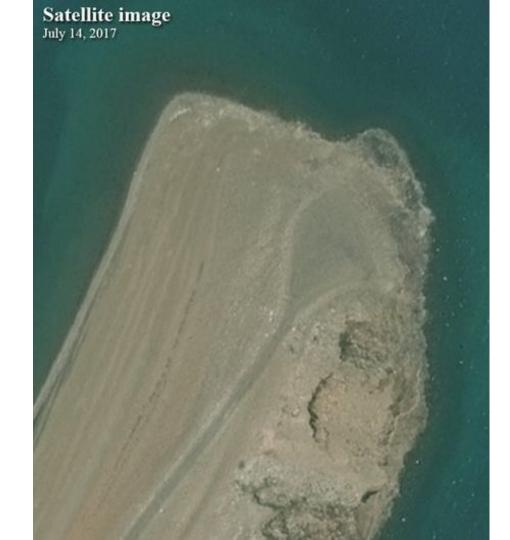






















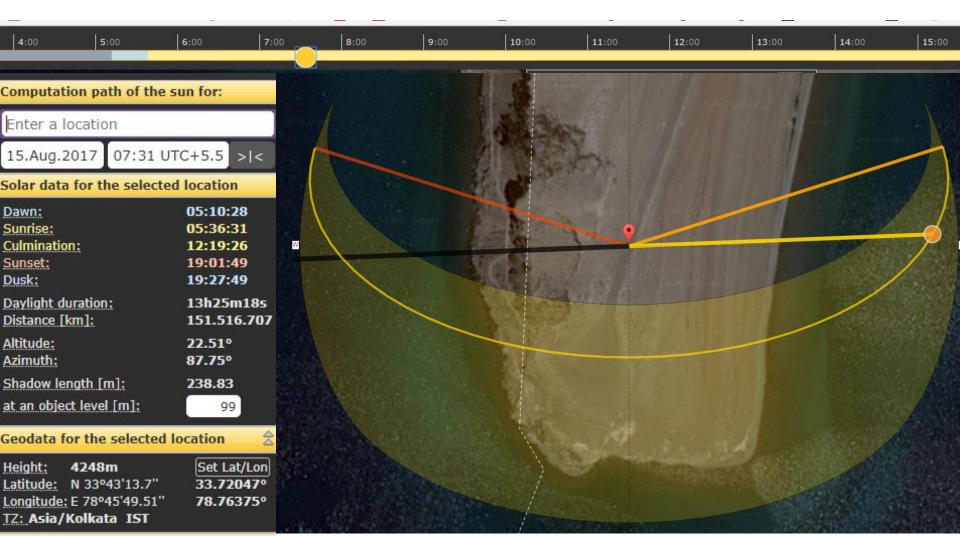




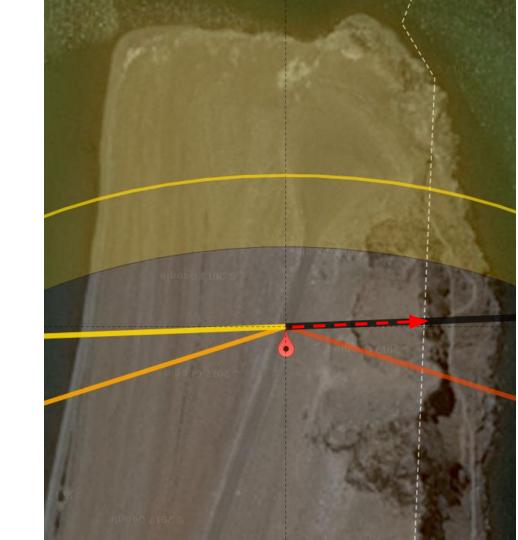




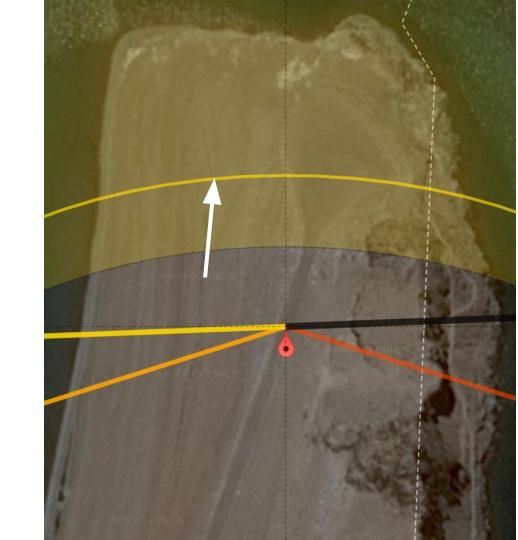




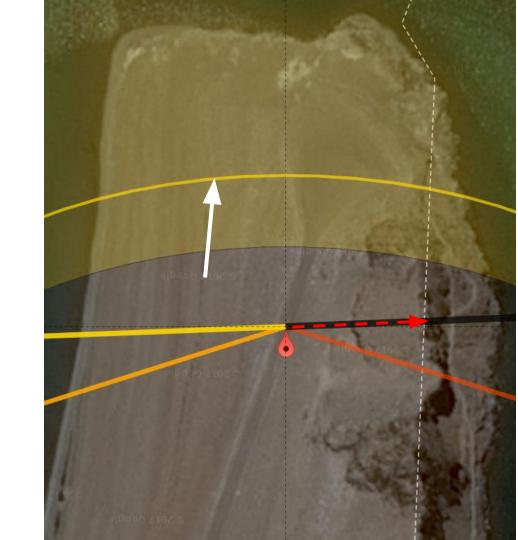












Who and Why?

We have a smaller digital toolset to establish who took a photograph or video, and why they did it.

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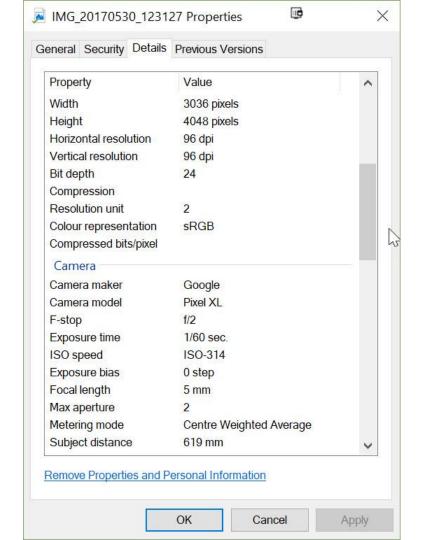
While verification is important, it is also vital to figure out the **real** author of photographs or videos - especially with the rise of licensing services for viral photographs and videos from social media (Storyful, Viralhog, Jukin Media, etc.)

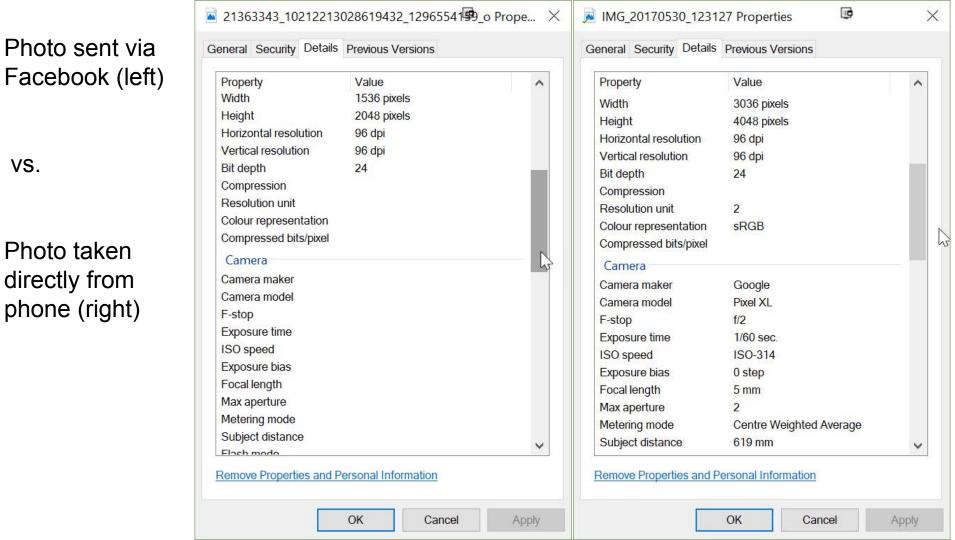
Metadata and Digital Forensics

Some interesting capabilities, but ultimately limited

Metadata can be useful for verifying photographs and videos straight from a device, but this metadata is lost when files are shared or sent through social networks or messaging applications.

If you want to receive a photograph and retain metadata, have it sent directly via email or MMS -- not Facebook chat, Telegram, Twitter, etc.





VS.

imageedited.com

Is Your Image Edited?

Analyze File

Drag image here to test if it is edited or photoshopped.

Exif and pixel tests tell if the photo is original or modified.

Exif Viewer shows the full raw exif data for your image.

For full image analysis, contact us for pricing.

Image Edited?

Probably

2017-09-08_8-42-07.jpg

Pixels only match software editors

<u>Test another image</u> · <u>Show Exif information</u> · <u>Send Us Feedback</u>

>

Possible Image Sources

Based on the pixels, this image could have been created with:

software: IMatch

Limits of naked-eye analysis

We may think we are good at finding fake photographs, but often we come up short. Also, freely available, easy-to-use digital analysis is difficult to come by.







Think Like a Faker

Creative verification to win the fake news arms race





Бой Карабах (Karabakh fight night)



Category



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Published on Apr 4, 2016

Age-restricted video (based on Community Guidelines) Gaming

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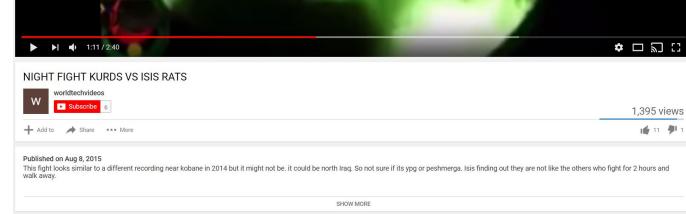
1,514 views 1 8 91 4





https://www.y outube.com/w atch?v=z6jLbrj

<u>-VOc</u>



• Think like a faker -- how would you find the source material to spread a fake photograph or video?

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- Be aware of filters, alterations, or added "noise" to make a photograph or video harder to trace back.
 - Zooming in on photograph/video
 - Mirroring
 - Extra logos/graphics in corners, obscuring details
 - Dubbed-in or removed audio (in order to add authenticity, or strip speech/languages)







Heavy firefight at night in Irag - YouTube







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Category

License

Published on Oct 26, 2016

People & Blogs Standard YouTube License





WhBa8

Фотография 3 из 13 Закрыть



- Photo shared on social media page of "Russian soldier" claiming to have shot down Malaysian Airlines Flight 17 (MH17)
- Profile seemed legitimate -friends, photos, apparently from real division in Russian military
- Shared geotagged photo of missile system in Donetsk, Ukraine
- Photo did not have any results on Google Image Search, suggesting it was original (thus, not borrowed/recycled from another source)

Место: Экскаваторная улица, Донецк

Добавлена 20 сентября 2014 | Мне нравится 🤍 5



Фотография 3 из 13





Место: Экскаваторная улица, Донецк

Добавлена 20 сентября 2014 | Мне нравится 🤍 5

Комментарии к этой фотографии скрыты настройками приватности.



Вадим Хома Фотографии на стене Вадима

It is not only fake "soldiers" altering images to pass them off as real. A Brazilian man named "Eduardo Martins" passed off the real photos of professional photographers as his own, after doing slight modifications to them, preventing results on reverse image searches. His photos were published on Getty, Deutsche Welle, Wall Street Journal, and other prestigious publications and photo services.











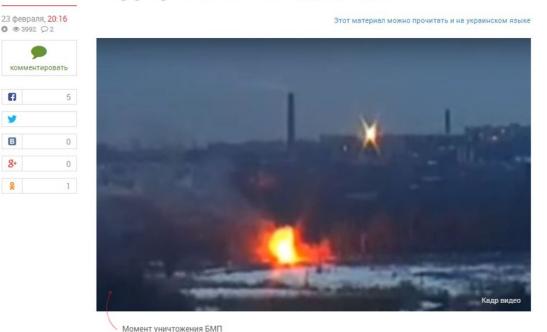






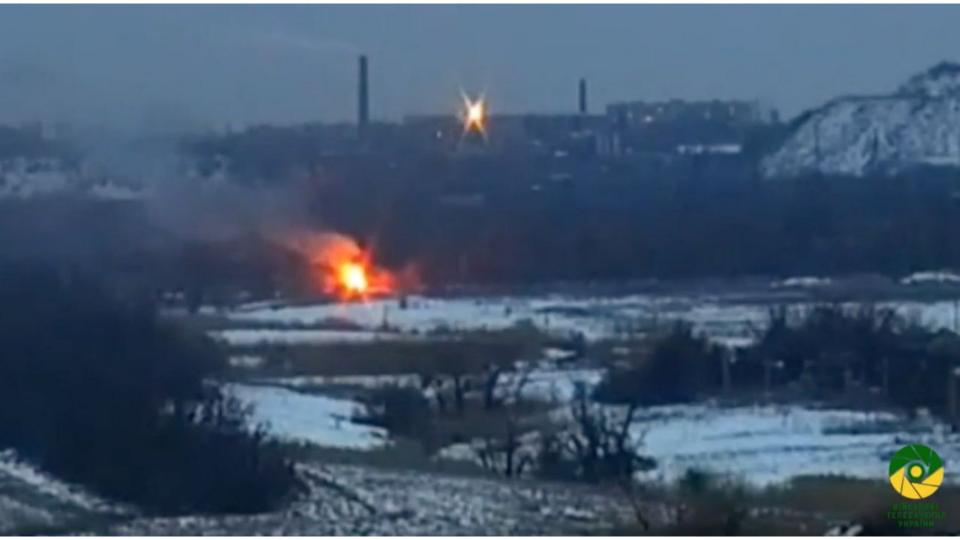
Advanced Geolocation

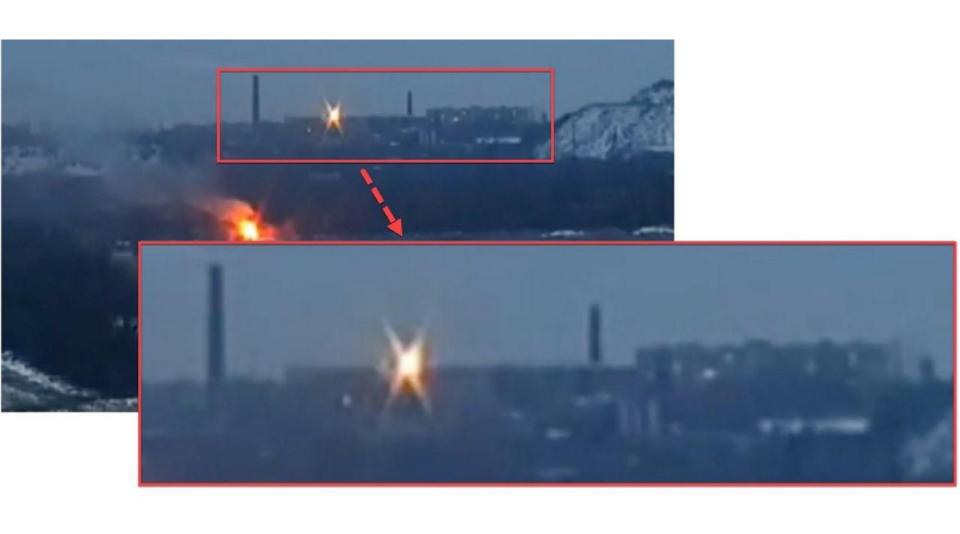
Офицер-десантник метким выстрелом из ПТРК уничтожил БМП террористов близ Донецка

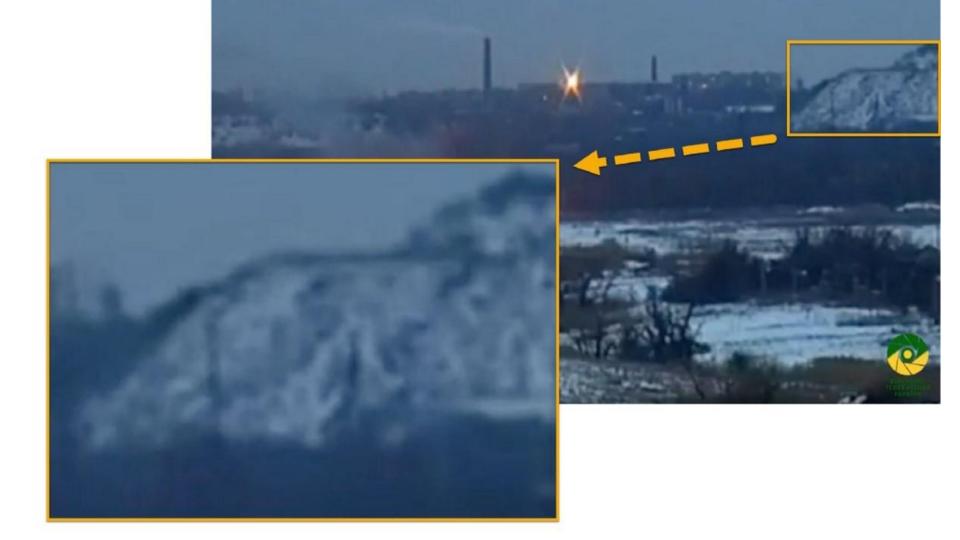




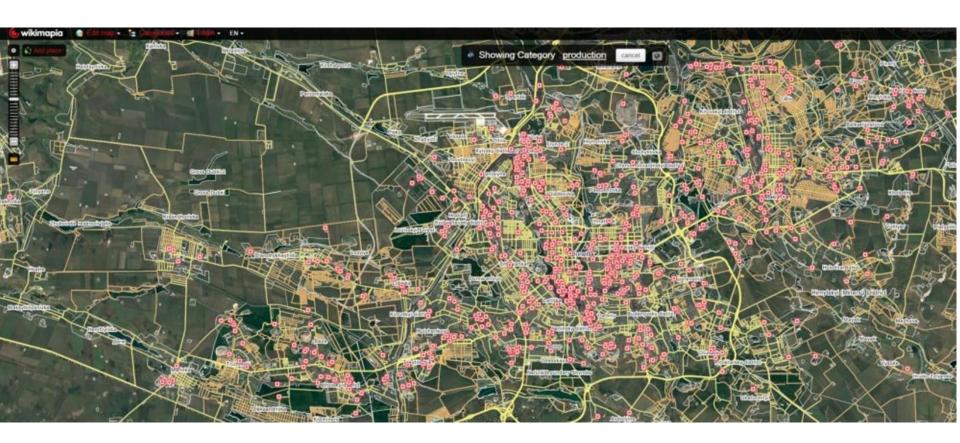
https://yout u.be/Ky9p Brc4Qwc







Wikimapia.org

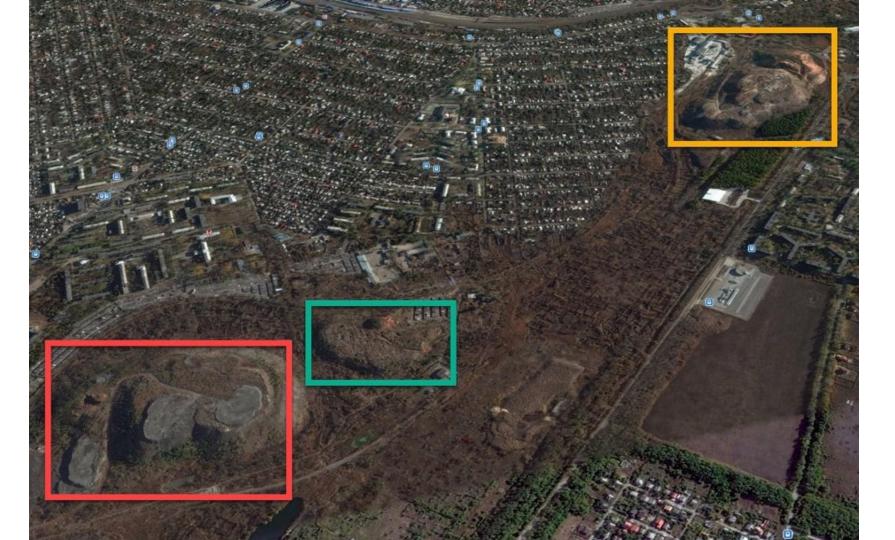


LiveUAMap.com



Where was the video shot?

- From territory under the control of the Ukrainian Armed Forces,
 with the camera facing Donetsk
- The BMP is located around a forested area, likely near the front line
- The video was shot near a factory with at least two smokestacks
- The video was shot facing a hill or terrikon (slagheap) to the right of the camera







Валерий Дед

Photo details

Uploaded on November 1, 2011 ● Attribution by Валерий Дед

