

The InVID Plug-in: Web Video Verification on the Browser

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Overview

- Introduction - problem formulation
- State-of-the-art on media verification
- Proposed approach: The InVID Plug-in
- Plug-in verification modules
- Case study
- Conclusions

Introduction – problem formulation

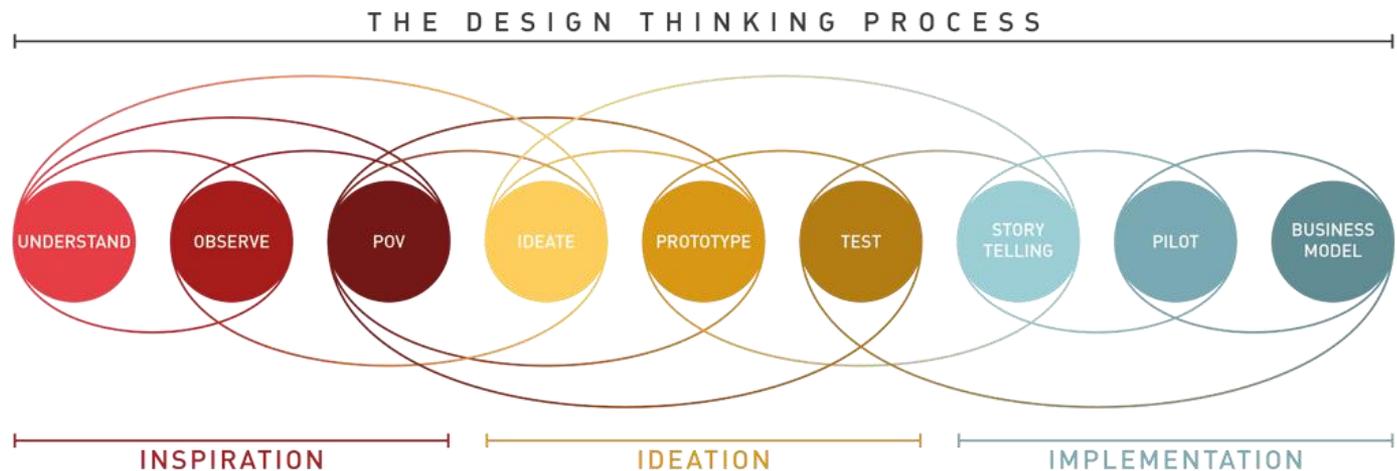
- User Generated Content (UGC): a valuable resource...
 - Digital media revolution & convergence of social media with broadband connectivity bring breaking news to online video platforms
 - News organizations often rely on user-generated recordings of breaking and developing news events shared via social media
- ...but also a tricky one
 - Deception facilitated by access to sophisticated editing and content management tools
 - Rapid spread of fake information in electronic networks
- Careful verification of third-party content is necessary for reputable news outlets; at present, this manual process
 - Reduces their ability to break news quickly
 - Increases their costs in times of tight budgets

State-of-the-art on media verification

- Daily routine in newsrooms contains:
 - Verification of images/videos posted on social networks
 - Debunking fake news and hoaxes spread via social media
- Current UGC verification pipeline for journalists:
 - Switch back and forth among several ever-changing tools and services
 - Video verification relies on:
 - Search engines, online translators, video playing and editing software, map services, and other services (e.g. historical weather information)
 - Image and video duplicate detection relies on:
 - Google image search, plug-ins such as RevEye¹ or TinEye²
 - The YouTube DataViewer³
 - The use of Google image search after taking screenshots of the video
- No integrated solution exists to address verification of UGC

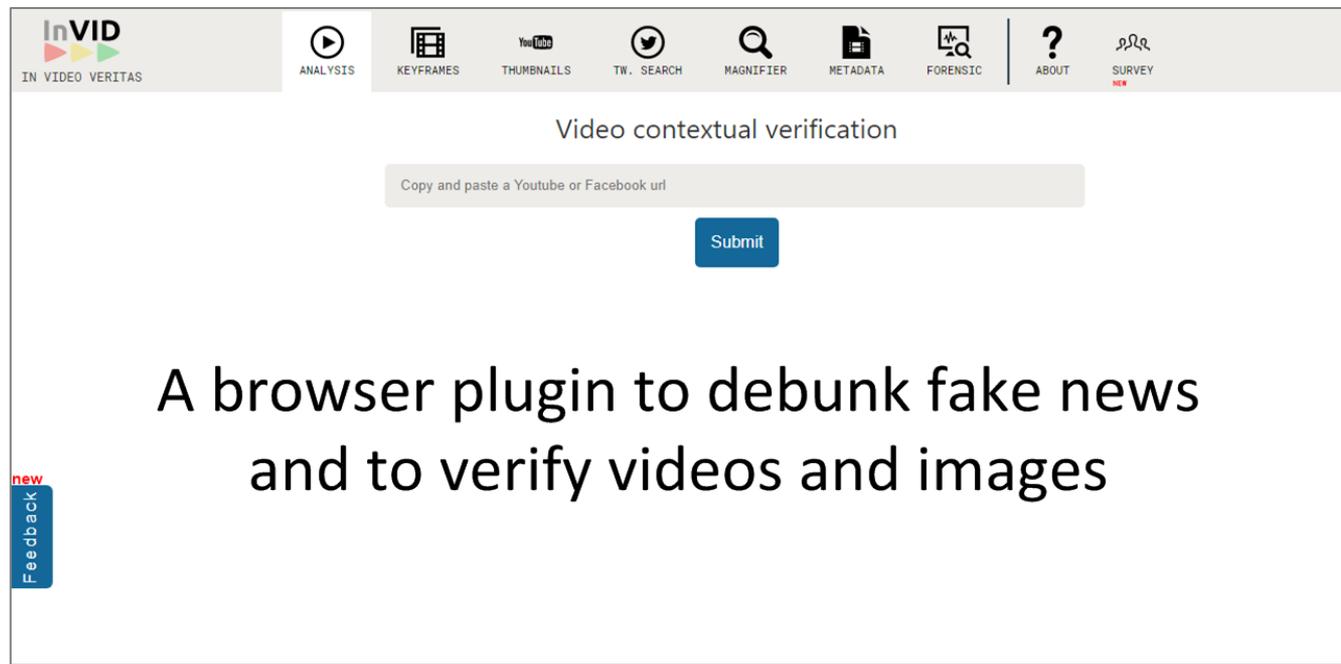
Proposed approach

- Through design thinking methodology, observing and understanding of journalistic workflows and of the difficulties when verifying information, **we built a browser plug-in that works as a verification “Swiss army knife”**



Proposed approach

- The plug-in provides a unified view over a number of third party services and novel technologies, via a single GUI
- It is freely available at: <http://www.invid-project.eu/verify>



Plug-in verification modules

- The InVID Plug-in integrates modules for:
 - Video context analysis
 - Advanced Twitter search
 - Video keyframe selection for reverse video search
 - Visual inspection of images and keyframes through a magnifying glass
 - Forensic analysis of keyframes

Plug-in verification modules

- Video context analysis: collects, extracts and presents to the user several data and metadata related to a video

Plug-in verification modules

- Video context analysis: collects, extracts and presents to the user several data and metadata related to a video
- Video and channel metadata contain:
 - Video name and description
 - Video and channel views count
 - Video upload date
 - Channel creation date
 - Locations mentioned in the description



Video contextual verification

<https://www.youtube.com/watch?v=UTegpMQKZaY>

Submit

Video:

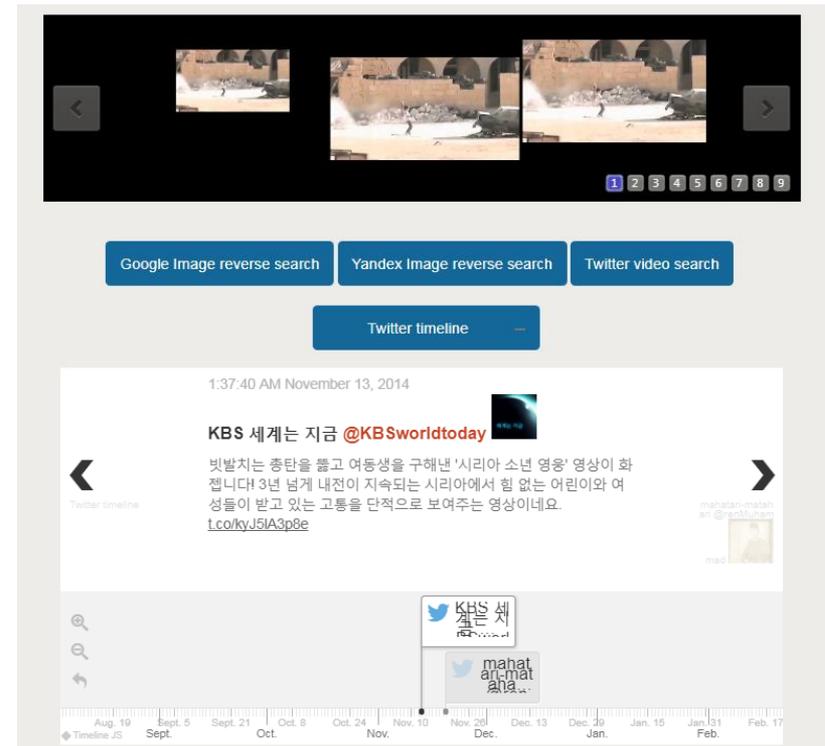
Video title	SYRIA! SYRIAN HERO BOY rescue girl in shootout. watch in HD !
Video description	NO WAR !!! NO WAR !
Video view count	164638
Like count	46
Dislike count	27
Duration	00:01:14
Upload time	2014-11-12, 10:28:15 AM +0000
Licensed content	false
Description mentioned locations	SYRIA
Recording location description	

Channel:

Channel description	
Channel created time	2013-01-11, 22:02:56 PM +0000
Channel view count	289669
Channel about page	https://www.youtube.com/user/Ghost713Mzurra/about
Channel location	GE

Plug-in verification modules

- Video context analysis: collects, extracts and presents to the user several data and metadata related to a video
- External search and Twitter timeline analysis:
 - Performs reverse image search using the available video thumbnails and the Google and Yandex engines
 - Searches for video-related posts on Twitter based on the video URL, allowing user to evaluate Twitter activity around the video



Plug-in verification modules

- Advanced Twitter search: allows to query Twitter by time interval up to the minute
- Converts regular calendar dates into Unix timestamps automatically
- Replaces a manual process that uses Epoch Converter¹

Twitter advanced search

Keyword or #

From (Twitter account name)

Filter (e.g. safe, media, retweets, native_video, periscope, vine, images, twimg o

Language (e.g. en, fr, de, es, ru, ja, zh...)

Geocode (e.g. -22.912214,-43.230182,1km or -22.912214,-43.230182,1mi)

Near (city name) Within (e.g. 15mi or 15km)

Since

Until

August 2017 Local time GMT

Su	Mo	Tu	We	Th	Fr	Sa
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Time 00:00

Hour

Minute

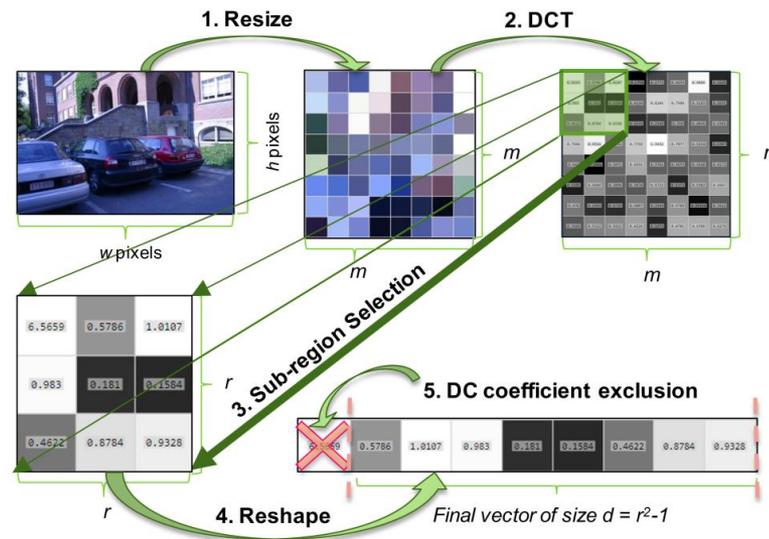
Now Done

Submit

1. <https://www.epochconverter.com>

Plug-in verification modules

- Keyframe selection: segments a single-shot video into sub-shots and selects one representative keyframe from each part
- Visual content is represented using Discrete Cosine Transform



- Each sub-shot is comprised by a set of temporally contiguous and visually similar frames based on the cosine similarity

Plug-in verification modules

- Keyframe selection: allows user to perform keyframe-based reverse video search on the Web

Dustin Lindskoog
@FuegoNugz

Irma in the islands



6:50 PM - 5 Sep 2017

149 Retweets 122 Likes

iti Information Technologies Institute
Multimedia Knowledge and Social Media Analytics Lab

On-line service for video fragment

JPG x Tropical cyclone

All Images Maps More Settings

Search by image Sep 1, 2015 - Aug 1, 2017 Clear

Sophie Kleeman's Recent Activities - Mic
<https://mic.com/profiles/152573/sophie-kleeman/activity>
175 x 115 - Feb 17, 2016 - Sophie is a staff writer at Mic covering the intersection of technology and culture. She's based in New York and can be reached at sophie@mic.com.

Das "Secret Sister" Gift Exchange On Facebook Is Very Illegal And ...
<https://rtds.org/the-secret-sister-gift-exchange-on-facebook-is-very-illegal-...>
575 x 323 - Oct 25, 2015 - Merry almost-Christmas, you've been hoaxed. If you've been on Facebook or Instagram recently, you may have noticed a fun little game going around among ...

Facebook Messenger Brings Facial Recognition To Your Camera Roll
<https://rtds.org/facebook-messenger-brings-facial-recognition-to-your-cam-...>
575 x 323 - Nov 9, 2015 - When you take a picture of your friends, you'll get a notification to send it to them through Messenger. Right now, it's just available in Australia. Last month ...

Hiru Gossip - ViYoutube.com
<http://www.hirugossip.info>
320 x 180 - Aug 2, 2016 - Exclusive Gossips from Around the World. Visit: <http://www.hirugossip.info>.

Futbolgolf Footgolf MTB/bicicletas - Google+
<https://plus.google.com/108444992714603401981>
110 x 110 - Jan 12, 2016 - Fútbolgolf, Soccergolf, Futbolgolf - Soca - Uruguay. Fútbolgolf, Soccergolf, Futbolgolf - Soca - Uruguay. 1 follower. About. Posts ...

Allah ka azab new allah ka azab Allah ka azab 2016 ... - LoveMaza.IN
www.lovemaza.in/video.php?...
480 x 360 - Jul 27, 2016 - Allah ka azab new allah ka azab Allah ka azab 2016 Allah ka azab real Allah ka azab in world - Unlimited Video Downloads, All Type Video Videos, Video ...

Estragos por Huracán Otto en Panamá - Hurricane Otto hits Panama ...
<https://www.youtube.com/watch?v=Sf3qMFL0uUA> Translate this page
168 x 94 - Nov 24, 2016 - Estragos causados por la Tormenta Tropical-Huracán Otto en Panamá entre el 21 y 23 de noviembre de 2016. Tormenta Tropical Otto: ...

Imágenes y videos muestran la destrucción de Otto - La Prensa Libre
<https://www.laprensalibre.crl.../imagenes-y-videos-mues-...> Translate this page
1280 x 720 - Nov 23, 2016 - Otto, que se convirtió de tormenta tropical a huracán y a volvió a ser el primer fenómeno ha dejado su huella en Panamá y Costa Rica, princip...



LA STRA VERBA
Promoted on Jan 14, 2016

EN VIDEO: El video que circula por las redes sociales sobre huracán en Honduras en agosto. Un video tomado en Honduras que muestra a una población que aparentemente fue gravemente afectada por el fenómeno ocurrido ayer en Guatemala y su área metropolitana en México, este video ya había sido visto.

Tornado dañinos, captado desde un comercio

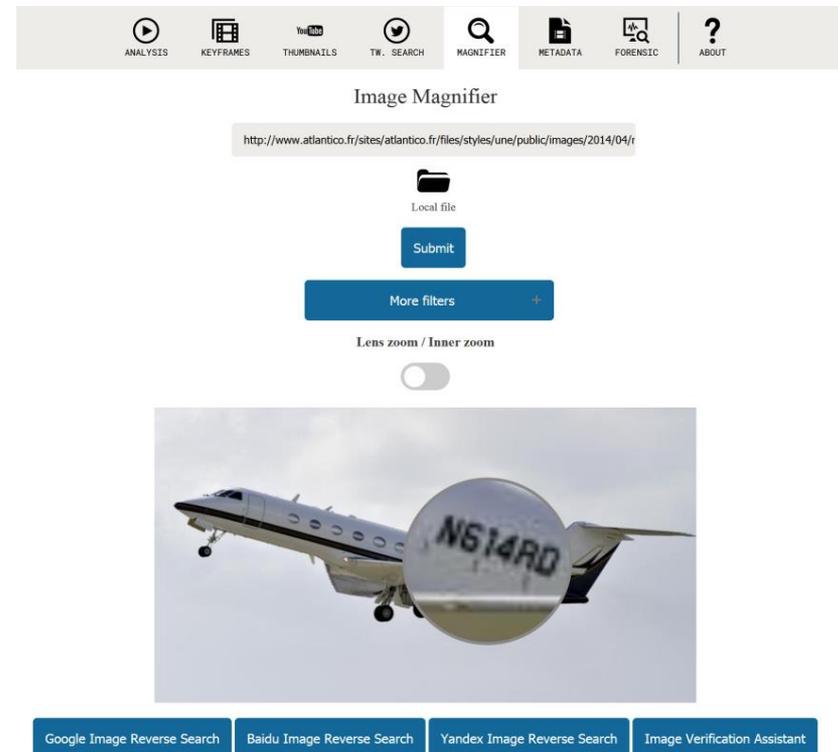
114,779 views

Enrico Martinez
Promoted on Nov 23, 2016

Category Music
License Standard YouTube License

Plug-in verification modules

- Keyframe magnifier: enables deep inspection of image or keyframe details through a digital magnifying glass
- These details might help to:
 - Confirm location or identity (e.g. car plates or signs)
 - Spot pixel incoherencies that indicate possible tampering
- Metadata reader presents related image/video metadata (creation / modification date, geo-coordinates, etc.)



Plug-in verification modules

- Forensic analysis of keyframes: provides analysis tools for tampering detection and localization in images
- Designed to cover professionals' needs for image verification

Integrated tampering localization algorithms

Double JPEG Quantization

JPEG Ghosts

JPEG Blocking Artifact Inconsistencies

Median Filtering Noise Residue

Discrete Wavelet High Frequency Noise Variance

Error Level Analysis

GRIDS (JPEG Blocking Grid Inconsistencies)

The screenshot displays the InVID web interface. At the top, there is a navigation bar with icons for ANALYSIS, KEYFRAMES, THUMBNAILS, TR. SEARCH, HANDEPIER, METADATA, FORENSIC, and ABOUT. Below the navigation bar, a 'Metadata summary' window is open, showing a table of image metadata. The table is divided into two sections: 'Significant Data' and 'JPEG'. The 'Significant Data' section includes fields like 'Date/Time' (2010:08:03 22:29:56), 'Gain Control' (Not Found), 'Image Description', and 'Image Height' (Not Found). The 'JPEG' section includes 'Compression Type' (Baseline), 'Data Precision' (8 bits), 'Image Height' (2448 pixels), 'Image Width' (3264 pixels), and 'Number of Components' (3). Below the metadata table, there is a grid of eight analysis maps labeled Map 0 through Map 7. Each map shows a different type of forensic analysis on the image, such as 'Double JPEG quantization inconsistencies (DQ)', 'JPEG Ghosts (GHOST)', 'JPEG blocking artifact inconsistencies (BLOCK)', 'Error Level Analysis (ELA)', 'Median Filtering noise residue (MEDIAN)', 'GRIDS', 'GRIDS-inversed', and 'High frequency noise (WAVELET)'. A 'Save your analysis as PDF' button is located at the bottom of the grid.

description	value	description	value
Exif IFD0		Compression Type	Baseline
Date/Time	2010:08:03 22:29:56	Data Precision	8 bits
Gain Control	Not Found	Image Height	2448 pixels
Image Description		Image Width	3264 pixels
Image Height	Not Found	Number of Components	3

Case study

- InVID Plug-in was used by several AFP and DW journalists over the last three months, helping to:
 - Debunk a fake video using the keyframe selection tool:
 - Shared video allegedly on the robbery of a Manila casino on June 2017, was an older video from a robbery in a Surinam casino on December 2011
 - Debunk a fake image using the Twitter advanced search tool:
 - Image shared on Twitter during the Champs Elysees failed attack, was a re-posted image from an arrest in London after a previous terror attack
 - Prove a wrong claim using the magnifier tool:
 - Image of a jet allegedly used by a candidate of the French presidential election to travel to a meeting was in fact registered in the US

Case study

- According to the analytics of the Google Chrome store the current users of the plug-in are more than 1000
- Based on the received feedback via social media:

The screenshot shows a Twitter thread with the following content:

- Benjamin T Decker** (@btdecker) · Aug 4: A must-have for a...
- Mohamed Kassab** (@MeKassab) · Sep 12: Hunchly is one of three good chrome extensions and everyone who investigates things online should use it.
- Sam Dubberley** (@samdubberley) · Jul 21: Nearly 100 videos to verify today. @InVID_EU plug-in proving invaluable to get through them speedily [invid-project.eu/invid-verification...](http://invid-project.eu/invid-verification) cc. @dteyssou
- Benjamin T Decker** (@btdecker) · Jul 29: huge props to @InVID_EU
- MediaShift Idea Lab** (@MediaShiftIdeaLab) · Jul 29: This new plugin from @InVID_EU @EU_H2020 @journalism_360
- InVID verification plugin open beta release - InVID project**: InVID is launching in open beta a plugin to help journalists saving time in their verification... invid-project.eu
- Mohamed Kassab** (@MeKassab) · Sep 12: Replying to @jospang @dteyssou and 11 others: Sure, hope to see it sophisticated more, I've talked about and recommended it to my colleagues here.

Case study

- According to the analytics of the Google Chrome store the current users of the plug-in are more than 1000
- Based on the received feedback via social media:

The plug-in is currently used by journalists and experts worldwide, effectively supporting them in their efforts to debunk a number of fake videos!

Conclusions and next steps

- The InVID plug-in seamlessly integrates a set of SoA tools and services for media analysis, that assist the verification of UGV
- Testing in real-life scenarios shows that it can speed up video verification process for journalists, media scholars and NGOs
- The InVID plug-in will be updated over the next months by enhancing the current features
- Stay tuned at: www.invid-project.eu

Questions?

More information:

<http://www.itl.gr/~bmezaris>

bmezaris@iti.gr