MODULE 6

Social media verification: assessing sources and visual content

by Tom Trewinnard and Fergus Bell

This module is designed to help participants identify and verify the original source of digital information online. It will introduce different strategies for determining the authenticity of sources, photos and videos, especially User Generated Content (UGC) shared via social networks.

By the end of this module, participants should be aware of different types of false and misleading content often shared during breaking news events on platforms such as *Facebook, Twitter, Instagram* and *YouTube*[159]. Such content is periodically picked up and carried by otherwise reliable news organisations, serving to discredit them. It is also inadvertently redistributed and amplified on social networks by journalists, who are sometimes targeted by malicious actors with a view to influencing public debate[160] and leveraging reporters' credibility as trusted sources[161].

Participants are asked to test their instincts with real-world scenarios and examples, before putting into practice basic investigative techniques and strategies for verifying content, including:

▷ Identifying and crediting original sources in line with the ethical principles guiding journalistic use of User Generated Content[162]

▷ Identifying and excluding fake accounts or bots[163 164]

▷ Confirming visual content is correctly attributed to the original source

▷ Verifying the recording and upload time of content

▷ Geolocating photos and video

Being able to identify and verify original content enables journalists to seek permission to publish User-Generated Content (UGC) in line with ethical and legal requirements.

---

159 Alejandro, J. (2010). *Journalism In The Age Of Social Media*. Reuters Institute Fellowship. Available at: http://reutersinstitute.politics.ox.ac.uk/sites/default/files/research/files/Journalism%20in%20the%20Age%20of%20Social%20Media.pdf [accessed 22/04/2018].].

160 Paulussen, S. & Harder, R. (2014). *Social Media References in Newspapers*. Journalism Practice, 8(5), pp.542-551.

161 Module Seven has a detailed discussion and treatment of this problem

162 See the Online News Association's UGC Ethics guide: https://ethics.journalists.org/topics/user-generated-content/ [accessed 18/4/2018].

163 Woolley, S.C. & Howard, P.N. (2017). *Computational Propaganda Worldwide: Executive Summary.* Samuel Woolley and Philip N. Howard, Eds. Working Paper 2017.11. Oxford, UK: Project on Computational Propaganda. comprop.oii.ox.ac.uk. Available at http://comprop.oii.ox.ac.uk/wp-content/uploads/sites/89/2017/06/Casestudies-ExecutiveSummary.pdf [accessed 22/04/2018].].

164 Joseph, R. (2018). Guide. *How to verify a Twitter account.* Africa Check. Available at https://africacheck.org/factsheets/guide-verify-twitter-account/. [accessed. 6/04/2018].

Outline

The writers Bill Kovach and Tom Rosenstiel, in *The Elements of Journalism*[165] affirm: "In the end, the discipline of verification is what separates journalism from entertainment, propaganda, fiction, or art.... Journalism alone is focused first on getting what happened down right...". In this spirit, this Module examines the "discipline of verification" in current times.

Social media has changed journalism practice. Real-time audience engagement has given rise to crowdsourcing content, and even reporting tasks like verification can now be outsourced to the audience.[166] While journalism remains in essence, a discipline of verification[167], methods of verifying content and sources require constant updating to reflect the impacts of fast-changing digital technologies, online behaviours, and newsgathering practices. For example, during the Arab Spring, the concept of 'open verification' - a process of public, collaborative, real-time verification - began to surface. But this process remains contentious because of the risks associated with misinformation going viral in the course of attempting to verify information step-by-step in a public forum (i.e. a reporter sharing unverified information with a view to crowdsourcing the verification process).[168]

Today, eyewitness accounts and visual content are amongst the most important and compelling tools a journalist or news publisher can draw on to tell a high impact story. In a breaking news scenario, speed is a critical factor in verifying information from social media.[169]

Journalists must be able to navigate vast amounts of information to get to sources, information and images that matter. The rapid growth in the amount of visual content (photos, videos and GIFs) uploaded to social platforms, is driven by three main factors:

▷ The proliferation of camera-enabled smart and feature phones around the world[170]

▷ Increased access to inexpensive (and in some places, free) mobile data

▷ The rise of global social networks and social messaging platforms on which anyone can publish content and build an audience

---

165 Kovach, B., & Rosenstiel, T. (2014). The elements of journalism: What newspeople should know and the public should expect. New York: Crown Publishers.

166 Carvin, A. (2012). *Distant witness: Social Media's Journalism Revolution*. New York, NY: CUNY Journalism Press.

167 Kovach, B. & Rosenstiel, T. (2014). Op cit

168 Posetti, J. & Silverman, S. (2014). *When Good People Share Bad Things: The basics of social media verification* at Mediashift July 24th, 2014. Available: http://mediashift.org/2014/07/goodwhen-good-people-share-bad-things-the-basics-of-social-media-verification/ [accessed 22/04/2018].].

169 Brandtzaeg, P., Lüders, M., Spangenberg, J., Rath-Wiggins, L. & Følstad, A. (2015). E*merging Journalistic Verification Practices Concerning Social Media.* Journalism Practice, 10(3), pp.323-342.

170 See Slide 5 of Mary Meeker's Internet Trends Report: https://www.slideshare.net/kleinerperkins/internet-trends-v1. [accessed 22/04/2018].].

In many breaking news scenarios, the first accounts, photos and video footage to emerge from an incident – be it a protest, a train crash, a hurricane, or a terrorist attack – are likely to be published by an eyewitness, participant or bystander with a smartphone. Techniques for verifying this content vary depending on newsrooms' resources, norms and standards, and journalists' own practices. This module will introduce students to some best practice methods and online tools and resources, but as with the technology, tools are evolving rapidly.[171]

With any verification, some general guidelines, offered by Kovach and Rosenstiel (2014)[172] apply:

- ▷ Edit with scepticism

- ▷ Keep an accuracy checklist

- ▷ Assume nothing – don't be misled by exploitation of signals associated with "truthiness"[173]

- ▷ Be cautious with anonymous sources.

By identifying the originator of information or images, and performing a system of checks on both the source and the content they have shared, you should find yourself in a position to verify them as the source, providing the checks give you the required outcomes.[174]

These checks replicate the work that a journalist might perform if they were physically present at the scene of a news event interviewing eyewitnesses. A journalist able to conduct an in-person interview would scrutinise the account of the eyewitness, follow up on important details and come to a conclusion about their reliability, based on fact-checking. Instinct can also be a partial guide – along with watching for behaviour clues. The process of confirming a source digitally must allow conclusions to be drawn, even if it is not possible to actually speak to a person directly, or in real-time.[175]

Many large newsrooms have teams and expensive technology, or agencies providing services, dedicated to finding this content as quickly as possible[176], while also acquiring the publishing and broadcast rights and verifying the content prior to publication. Most

---

171 Schifferes, S., Newman, N., Thurman, N., Corney, D., Göker, A. & Martin, C. (2014). *Identifying and Verifying News through Social Media.* Digital Journalism, 2(3), pp.406-418.

172 Kovach & Rosenstiel (2014). Op cit.

173 Zimmer, B (2010). "Truthiness", The New York Times. https://www.nytimes.com/2010/10/2017/magazine/2017FOB-onlanguage-t.html [accessed 15/04/2018].

174 Bell, F. (2015). *Verification: Source vs Content* [*online*] *Medium.* Available at: https://medium.com/1st-draft/verficiation-source-vs-content-b67d6eed3ad0 [accessed 22/04/2018].].

175 Kovach & Rosenstiel (2014). Op cit.

176 Diakopoulos N., De Choudhury M. & Naaman M. (2012). *Finding and assessing social media information sources in the context of journalism* Conference on Human Factors in Computing Systems - Proceedings, , pp. 2451-2460. Available at: http://www.nickdiakopoulos.com/wp-content/uploads/2011/07/SRSR-diakopoulos.pdf [accessed 22/04/2018].

smaller newsrooms and many individual journalists do not have the same resources,[177] and rely on their own evolving, systematic methodology to determine trustworthiness.[178]

Why is verification of the source and visual content so important? Put simply: it is good journalism. In today's digital world, it is straightforward for ill-intentioned actors to create and share convincing and difficult to detect fakery. There are many cases where professional journalists and newsrooms have damaged their reputation by sharing or republishing misleading information, photos or videos or information from fake persons. At times, they have also misinterpreted satirical content, sharing or publishing it as fact.[179]

The problem is compounded by the volume of visual content available online, all of which can be stripped of context and recycled in future news events, as we see happen daily around the world with hoaxers tricking politicians and professional journalists alike.

There are, however, numerous steps that can be taken to assess the credibility of a given source who has a story to tell, or content to share. Important questions should be asked, some directly, some answered by using the evidence available through investigation. Verification tools can be used to establish where a source has posted from, but it is also possible to manually triangulate a source by analysing their social media history to check for clues that could indicate the feasibility of them being in a particular place at a particular time. Examining the history of their interactions with other users and checking linked content within posts also assists in the manual verification process and can help eliminate information shared by bots.

Sceptical editing is essential, but the vast majority of individuals who get caught up in news events and share their stories are not looking to deceive - they are just sharing their experiences. If misinformation arises, it may not be malicious. Instead it could simply be that the individual cannot remember the events properly or has perhaps chosen to embellish the story. This could also occur if you had the opportunity to conduct a physical, in-person interview, as is frequently borne out in conflicting reports and statements from the scenes of crimes or accidents, where the accounts of traumatised witnesses or victims can vary considerably.

While it might not be possible to ascertain with full certainty the provenance of visual content, there are a number of "red flags" that can be uncovered through a simple verification process that asks:

177 Schifferes, S., Newman, N., Thurman, N., Corney, D., Goker, A.S. & Martin, C. (2014). *Identifying and verifying news through social media: Developing a user-centred tool for professional journalists.* Digital Journalism, 2(3), pp. 406-418. Available at http://openaccess.city. ac.uk/3071/1/IDENTIFYING AND VERIFYING NEWS THROUGH SOCIAL MEDIA.pdf [accessed 22/04/2018].].

178 Brandtzaeg, P. B., Lüders, M., Spangenberg, J., Rath-Wiggins, L., & Følstad, A. (2016). *Emerging journalistic verification practices concerning social media.* Journalism Practice, 10(3), 323-342.

179 Deutsche Welle (2018) *Germany's Bild falls for hoax and unleashes fake news debate* (22/02/2018)
     Available at http://www.dw.com/en/germanys-bild-falls-for-hoax-unleashes-debate-on-fake-news/a-42704014 [accessed 22/04/2018].].

> ▷ Is the content original, or has it been "scraped" from previous reporting and re-appropriated misleadingly?

> ▷ Has the content been digitally manipulated in some way[180]

> ▷ Can we confirm the time and place of the photo/video capture, using available metadata?

> ▷ Can we confirm the time and place of the photo/video capture, using visual clues in the content?

To find red flags efficiently, we also need to understand the different types of common false or misleading visual content:

> ▷ **Wrong time/wrong place:** the most common type of misleading visuals are old visuals that are being re-shared with new claims about what they show. Virality in such cases is often caused by accidental sharing, of content that can be easy to debunk, but not easy to pull back[181]

> ▷ **Manipulated content:** content that has been digitally manipulated using photo or video editing software

> ▷ **Staged content:** original content that has been created or shared with the intent of misleading[182]

In this module, students will be introduced to basic tools and techniques to learn and practice source and content verification (slides, including instructors notes, and additional reading provided) such as:[183]

Facebook account analysis: Using an online tool from Intel Techniques[184] you can find out more about a source by analysing their Facebook account.

Twitter account analysis: Using this guide from Africa Check you can find out more about the source by analysing their social history and thereby identify whether it is a bot tweeting.[185]

---

180 Student survivors of the mass shooting at a school in Parkland, Florida, USA, who organised a successful national protest for gun control, featured in manipulated images spread on partisan social media channels https://www.buzzfeed.com/janelytvynenko/here-are-the-hoaxes-and-conspiracies-still-going-around?utm_term=.euy6NPayy#.jhe2YvV44. [accessed 22/04/2018].].

181 This video claiming to be evidence of a flood at Bengaluru International Airport in India was in fact a rehashed video from a flood at a Mexican airport.
https://www.thequint.com/news/webqoof/fake-video-claiming-bengaluru-airport-was-flooded-is-from-mexico [accessed 22/04/2018].].

182 Artificial intelligence and sophisticated video editing tools make it difficult to discern fake videos, as this footage of Barack Obama shows: https://www.youtube.com/watch?v=AmUC4m6w1wo [accessed 03/04/2018].

183 Note that news tools continue to evolve and the instructor, together with the learners can discover and test these technologies and techniques.

184 Available at: https://inteltechniques.com/osint/facebook.html. [accessed 03/04/2018].

185 Joseph (2018). Op cit

Reverse Image Search: Using either Google Reverse Image Search[186], TinEye[187] or RevEye[188], you can check to see if an image is being recycled to support a new claim or event. Reverse image search lets you see if one or more image databases (with billions of images) contain an earlier version of the image. If reverse image search shows an image existing before a claimed event, this is a major red flag and it is likely the image is recycled from an earlier event. If reverse image search does not return any results, this does not mean the image is original, and you still need to do additional checks.

YouTube Data Viewer: There is no publicly available "reverse video search" - but tools like Amnesty's YouTube Data Viewer[189], InVID[190] and NewsCheck[191] can detect video thumbnails for YouTube videos, and a reverse image search on those thumbnails can reveal if earlier versions of the video have been uploaded. (Tools also show the exact time of upload.)

EXIF Viewer: EXIF is metadata attached to visual content that includes a wide range of data points created by digital cameras and phone cameras at the point of capture. These can include exact time and date, location metadata, device data, and light setting information. EXIF metadata is thus extremely helpful in the verification process, but a major limitation is that social networks strip the metadata from visual content. This means images shared on Twitter or Facebook will not display EXIF data. If, however, you are able to contact the uploader and acquire the original image file, you can use EXIF data to verify the content. It is also important to note that EXIF data can be modified, so further verification is required.

Participants will get a basic introduction to more advanced techniques, with additional resources for further reading and case studies provided. These techniques include:

▷ **Geolocation:** Geolocation is the process of determining *where* a video or image was captured. This can be straightforward if adequate metadata is available: EXIF data from mobile phones often reveals coordinates, and social content (on Instagram, Facebook and Twitter, for example) is occasionally geotagged (though it is important to note that such metadata is editable and can be misleading). Often, geolocation requires cross-referencing visual characteristics and landmarks from the content with satellite imagery, street-view imagery and visual content available from other sources (such as other visual content posted to Twitter, Instagram, Facebook and YouTube).

186 *How to do a Google Reverse Image Search*: https://support.google.com/websearch/answer/1325808?hl=en [accessed 22/04/2018].].

187 Go to https://www.tineye.com/ [accessed 22/04/2018].].

188 http://squobble.blogspot.co.uk/2009/12/chromeeye-tineye-extension-for-google.html [accessed 22/04/2018].].

189 *How to use Amnesty's YouTube Data Viewer*: https://firstdraftnews.org/curriculum_resource/youtube-data-viewer/ [accessed 22/04/2018].].

190 InVid video verification tool available at: http://www.invid-project.eu/tools-and-services/invid-verification-plugin/. [accessed 22/04/2018].

191 *About NewsCheck*: https://firstdraftnews.org/launching-new-chrome-extension-newscheck/ [accessed 22/04/2018].

> **Weather corroboration:** Sources such as WolframAlpha[192] can reveal historical weather data, allowing us to check if the weather observable in visual content is corroborated by the historical record. (i.e. Is the video showing rain on a day no rain was observed by meteorological sources?)

> **Shadow analysis:** One line of investigation into a photo or video is to examine the internal consistency of any visible shadows (i.e. are there shadows where we would expect them to be, and are any visible shadows consistent with relevant light sources?)

> **Image forensics:** Some tools are able to detect inconsistencies in image metadata that suggest manipulation. The validity of these techniques is highly subject to the context and application, but tools such as Forensically[193], Photo Forensics[194] and IziTru[195] can carry out clone detection and error level analysis that could provide useful insights.

Module Aims

> To increase awareness of the role of User Generated Content (UGC) shared via social networks in contemporary journalism, along with the risks and pitfalls associated with relying on it

> To achieve a broad understanding of the importance of securing access and information from the primary source in a story and the process to do so

> To extend understanding of the need to verify UGC content, and exclude different types of fake and misleading content

> To increase awareness of the basic methods used to verify images and video, and debunk false visual content

Learning Outcomes

1. A deeper understanding of the role of UGC in contemporary journalism

2. Understanding the need for verification of digital content

3. Awareness of, and a technical understanding of, how to use tools to verify an original source

4. The ability to conduct basic verification steps for photo and video content

---

192 WolframAlpha tools available at https://www.wolframalpha.com/examples/science-and-technology/weather-and-meteorology/ [accessed 22/04/2018].

193 Wagner, J. (2015). *Forensically, Photo Forensics for the Web*. [Blog] 29a.ch. Available at: https://29a.ch/2015/08/16/forensically-photo-forensics-for-the-web [accessed 22/04/2018].

194 Fotoforensics tools available at: http://fotoforensics.com/ [accessed 22/04/2018].

195 Izitru tools available at: https://www.izitru.com/ [accessed 22/04/2018].

5. Awareness of more advanced techniques and metadata that can be used in verification processes

6. Awareness of the need to seek permission to use UGC and other online content and the knowledge of how to do so

Module Format

This module is presented as a 60-minute theoretical lecture and a 120-minute, three-part practical demonstration. However, the practical nature of the subject, lends itself to a longer form interactive workshop with practical exercises to supplement the demonstrations.

Theoretical: Using the notes above, design a lecture dealing with verification as an integral but evolving part of journalism's method in the digital age.

Practical: The 120-minute practical session lends itself to an interactive demonstration and workshop. It can be divided into three distinct parts.

Educators should use the notes above and work through the slides which can be download from the following links. Note there are additional instructor notes attached to the slides:

i. **Source identification and verification.** Checking social history of sources: https://en.unesco.org/sites/default/files/unesco_fake_news_curriculum_verification_digital_sources_one.pdf

ii. **Basic image verification.** Common types of false imagery and basic verification steps: https://en.unesco.org/sites/default/files/unesco_fake_news_curriculum_verification_digital_sources_two.pdf

iii. **More advanced** verification. Approaches for content analysis, including metadata analysis and geolocation: https://en.unesco.org/sites/default/files/unesco_fake_news_curriculum_verification_digital_sources_three.pdf

Linking Plan to Learning Outcomes

A. Theoretical

Module Plan	Number of hours	Learning Outcomes
Lecture: Background & theory on verification and evolution of methods	1 hour	1, 2, 6

B. Practical

Module Plan	Number of hours	Learning Outcomes
i) Source verification - social (Exercise)	30 mins	2, 3
ii) Reverse Image Search (Demonstration & exercise)	15 mins	2, 3, 4
ii) Analysing video (Demonstration)	30 mins	2, 3, 4
iii) Introduction to different types of metadata (Demonstration)	15 mins	2, 5
iii) Geolocation (Demonstration + exercise)	20 mins	2, 4, 5
iii) Weather, shadows and image forensics (Demonstration)	10 mins	2, 4, 5

Suggested Assignment

▷ Participants should design a source verification workflow using the generic template in slide 8 of the first slide deck. Participants should either use a real role, place they work, or a news organisation that they are familiar with.

▷ Select a connected social media account of a popular person and ask participants to use the tools demonstrated to determine whether they are genuine accounts and to identify any related but not authentic accounts.

▷ Select and share an image file with the class and ask them to identify certain pieces of information by running it through an online EXIF viewer and a Reverse Image Search tool in order to tell you the original source.

Materials

Slides

1. https://en.unesco.org/sites/default/files/unesco_fake_news_curriculum_verification_digital_sources_one.pdf

2. https://en.unesco.org/sites/default/files/unesco_fake_news_curriculum_verification_digital_sources_two.pdf

3. https://en.unesco.org/sites/default/files/unesco_fake_news_curriculum_verification_digital_sources_three.pdf

Reading

Source verification

Ayala Iacucci, A. (2014). *Case Study 3.1: Monitoring and Verifying During the Ukrainian Parliamentary Election, Verification Handbook*. European Journalism Centre. Available at: http://verificationhandbook.com/book/chapter3.1.php. [accessed 04/04/2018].

Bell, F. (2015). *Verification: Source vs.* Content, First Draft News. Available at: https://medium.com/1st-draft/verification-source-vs-content-b67d6eed3ad0. [accessed 04/04/2018].

Carvin, A. (2013), *Distant Witness*, CUNY Journalism Press. Available at: http://press.journalism.cuny.edu/book/distant-witness-social-media-the-arab-spring-and-a-journalism-revolution/. [accessed 04/04/2018].

Toler, A. (2017). *Advanced guide on verifying video content.* Available at: *https://www.bellingcat.com/resources/how-tos/2017/06/30/advanced-guide-verifying-video-content/.*[accessed 04/04/2018].

Trewinnard, T. (2016). *Source verification: Beware the bots, First Draft News.* Available at: https://firstdraftnews.com/source-verification-beware-the-bots/. [accessed 04/04/2018].

Video

Real or Fake: How to verify what you see on the internet. (2015). France24. Available at https://www.youtube.com/watch?v=Q8su4chuU3M&feature=yout [accessed 04/04/2018].

Knight, W. (2018). *The Defense Department has produced the first tools for catching deepfakes,* MIT Technology Review. https://www.technologyreview.com/s/611726/the-defense-department-has-produced-the-first-tools-for-catching-deepfakes/ [accessed 23/08/2018].

Eyewitness Media

Brown, P. (2015). *A global study of eyewitness media in online newspaper sites.* Eyewitness Media Hub. Available at http://eyewitnessmediahub.com/uploads/browser/files/Final%20Press%20Study%20-%20eyewitness%20media%20hub.pdf. [accessed 04/04/2018].

Hermida, A. (2013). *#JOURNALISM.* Digital Journalism, 1(3), pp.295-313.

Koettl, C. (2016, January 27). *Citizen Media Research and Verification: An Analytical Framework for Human Rights Practitioners.* Centre of Governance and Human

Rights, University of Cambridge. Available at https://www.repository.cam.ac.uk/handle/201810/253508. [accessed 04/04/2018].

Kuczerawy, A. (2016, December 16). *Pants on fire: content verification tools and other ways to deal with the fake news problem*. Available at https://revealproject.eu/pants-on-fire-content-verification-tools-and-other-ways-to-deal-with-the-fake-news-problem/ [accessed 22/01/2018].

Novak, M. (n.d.). *69 Viral Images From 2016 That Were Totally Fake*. Available at https://gizmodo.com/69-viral-images-from-2016-that-were-totally-fake-1789400518. [accessed 12/11/2017].

Online News Association: UGC Ethics Guide https://ethics.journalists.org/topics/user-generated-content/ [accessed 18/4/2018].

Pierre-Louis, K. (2017). *You're probably terrible at spotting faked photos*. Available at https://www.popsci.com/fake-news-manipulated-photo. [accessed 12/11/2017].

Rohde, D. (2013). *Pictures That Change History: Why the World Needs Photojournalists*. The Atlantic. Available at https://www.theatlantic.com/international/archive/2013/12/pictures-that-change-history-why-the-world-needs-photojournalists/282498/. [accessed 03/04/2018].

Shapiro, I., Brin, C., Bédard-Brûlé, I. & Mychajlowcz, K. (2013) *Verification as a Strategic Ritual: How journalists retrospectively describe processes for ensuring accuracy*, published in Journalism Practice, 7(6).

Smidt, J. L., Lewis, C. & Schmidt, R. (2017). *Here's A Running List Of Misinformation About Hurricane Irma*. Available at https://www.buzzfeed.com/janelytvynenko/irma-misinfo/. [accessed 23/10/2017].

Wardle, C. (2015). *7/7: Comparing the use of eyewitness media 10 years on*. Available at https://firstdraftnews.com:443/77-comparing-the-use-of-eyewitness-media-10-years-on/. [accessed 12/11/2017].

Wardle, C., Dubberley, S., & Brown, P. (2017). *Amateur Footage: A Global Study of User-Generated Content in TV and Online News Output*. Available at http://usergeneratednews.towcenter.org/how-when-and-why-ugc-is-integrated-into-news-output/. [accessed 23/10/2017].

Zdanowicz, C. (2014). *"Miracle on the Hudson" Twitpic changed his life*. Available at http://www.cnn.com/2014/01/15/tech/hudson-landing-twitpic-krums/index.html. [accessed 12/11/2017].

Reverse Image Search

First Draft News. *Visual Verification Guide - Photos* -. Available at https://firstdraftnews.org/wp-content/uploads/2017/03/FDN_verificationguide_photos.pdf?x47084. [accessed 06/11/2017].

First Draft News. *Visual Verification Guide - Video* -. Available at https://firstdraftnews.org/wp-content/uploads/2017/03/FDN_verificationguide_videos.pdf?x47084. [accessed 06/11/2017].

Suibhne, E. (2015). *Baltimore "looting" tweets show importance of quick and easy image checks.* Available at https://medium.com/1st-draft/baltimore-looting-tweets-show-importance-of-quick-and-easy-image-checks-a713bbcc275e. [accessed 06/11/2017].

Seitz, J. (2015). *Manual Reverse Image Search With Google and TinEye.* Available at https://www.bellingcat.com/resources/how-tos/2015/05/08/manual-reverse-image-search-with-google-and-tineye/. [accessed 06/11/2017].

YouTube Data Viewer

First Draft News. (n.d.). *Using YouTube Data Viewer to check the upload time of a video* -. Available at https://firstdraftnews.com:443/resource/using-youtube-data-viewer-to-check-the-upload-time-of-a-video/. [accessed 13/11/2017].

Toler, A. (2017). *Advanced Guide on Verifying Video Content.* Available at https://www.bellingcat.com/resources/how-tos/2017/06/30/advanced-guide-verifying-video-content/. [accessed 13/11/2017].

Metadata Analysis

Honan, M. (2012). *How Trusting in Vice Led to John McAfee's Downfall.* Available at https://www.wired.com/2012/12/how-vice-got-john-mcafee-caught/. [accessed 03/04/2018].

Storyful. (2014). *Verifying images: why seeing is not always believing.* Available at https://storyful.com/blog/2014/01/23/verifying-images-why-seeing-is-not-always-believing/. [accessed 13/11/2017].

Wen, T. (2017). *The hidden signs that can reveal a fake photo.* Available at http://www.bbc.com/future/story/20170629-the-hidden-signs-that-can-reveal-if-a-photo-is-fake. [accessed 12/11/2017].

Content Analysis

Ess, H. van. (2017). *Inside the trenches of an information war.*.Medium. Available at https://medium.com/@henkvaness/how-to-date-a-mysterious-missile-launcher-78352ca8c3c3. [accessed 03/04/2018].

Farid, H. (2012a). *Image Authentication and Forensics | Fourandsix Technologies - Blog - A Pointless Shadow Analysis*. Available at http://www.fourandsix.com/blog/2012/9/4/a-pointless-shadow-analysis.html. [accessed 03/04/2018].

Farid, H. (2012b). *Image Authentication and Forensics | Fourandsix Technologies - Blog - The JFK Zapruder Film*. Available at http://www.fourandsix.com/blog/2012/9/11/the-jfk-zapruder-film.html. [accessed 03/04/2018].

Farid, H. (n.d.-c). Photo Forensics: In the Shadows - Still searching - Fotomuseum Winterthur. Available at http://www.fotomuseum.ch/en/explore/still-searching/articles/26425_photo_forensics_in_the_shadows. [accessed 03/04/2018].

First Draft News. (2016). *Watch Eliot Higgins demonstrate advanced verification techniques at #FDLive*. Available at https://firstdraftnews.com:443/watch-eliot-higgins-discuss-advanced-verification-and-geolocation-techniques-at-fdlive/. [accessed 03/04/2018].

Higgins, E. (2015, July 24). *Searching the Earth: Essential geolocation tools for verification*. Available at https://medium.com/1st-draft/searching-the-earth-essential-geolocation-tools-for-verification-89d96obb8fba. [accessed 03/04/2018].

Online resources

First Draft Interactive: Geolocation Challenge. Available at https://firstdraftnews.com/resource/test-your-verification-skills-with-our-geolocation-challenge/. [accessed 03/04/2018].

First Draft Interactive: Observation Challenge. Available at https://firstdraftnews.com/resource/test-your-verification-skills-with-our-observation-challenge/. [accessed 03/04/2018].

First Draft Online Verification Course. Available at https://firstdraftnews.org/learn/ [accessed 03/04/2018]