

FACT Archive: Facts Anyone Can Trust

“For how could you establish even the most obvious fact when there existed no record outside your own memory?” George Orwell, 1984

How do we separate fact from fiction in the digital world? There is no perfect resolution, but one part of a solution may be a blockchain to validate and freeze the past, so the future cannot manipulate history for its own purposes. Without the presence of an accessible, neutral arbiter of past facts, society risks destabilization and a growing, corrosive mistrust.

The FACT Archive would be a decentralized, apolitical and trustworthy repository of information. Validating photos, web pages, tweets, news stories and internet ephemera. Upon receipt of new material, the FACT Archive would authenticate the sender, the circumstances of its submission, and store a hash that can be used to prove the original content was intact. A blockchain inspired network of FACT Archives mutually confirms the hash and authentications are true. Their strong and independent databases provide confidence that no individual or government has corrupted the past. Storing the actual content is unnecessary, but some FACT members may choose to do so on a selective basis.

How would the FACT Archive work?

Step 1- Content entry: To prime the system, individuals or organizations would receive a **public key** validating their identity. They **sign** any material (video, web pages, photos, etc) with that key, before submitting a link or the content to the FACT Archive. The material might be a photo and associated meta-data. Metadata might include names of people in photo, circumstances surrounding the image, purpose for taking the photo, copyright, etc. The user has the option of submitting the same file to multiple ledgers, in which case only files with identical hashes are entered into the blockchain.

Step 2- Logging entry: The FACT Archive combines the submitted content with an associated **digital fingerprint** (Public key identity, GPS, IP address, MAC, synchronicity¹, etc. The fingerprint can substitute for the public key in many

¹ A “synchronicity” fingerprint allows two independent content providers to internally validate an event, by tagging each other at the time and place. For example, an AP and Breitbart

situations, e.g simply establishing the content date). FACT Archive creates a **hash** of the content using a publicly available hash function, and stores the hash and digital fingerprint in the blockchain. Each element in the chain has a unique ID number. Modified content will generate a different hash for that ID, flagging the potential tampering.

Step 3- Content Validation: After Entry and Logging, content would be available to users. Browsers would automatically confirm the content’s identity via the hash function and ID, displaying that validation in-line (perhaps a special frame around the content, a roll-over balloon, a pop-up warning if information is corrupted or from masquerading sources, a FACT score, etc). Users could submit un-validated content to the FACT Archive, or to an app running the open hash function, to check if the content is in the blockchain. AI systems might incorporate a FACT web validation and fingerprint to “score” the truthiness of stories or tweets.

Issues: The hash function is actually more challenging to design than the blockchain. In retrospect, holes or correlations have been discovered in hash functions (like MD5) which allow a smart adversary to spoof the hash. What makes a hash function valuable (i.e. detecting even a single flipped bit) means the FACTs Archive protected material cannot be edited in any way without triggering an alarm. Yet a smart hash function should allow reasonable modifications of the content that do not affect its factual nature. For example, changing the size of a photo seems reasonable, but not adjusting its color balance² or cropping. Yet a clever adversary could selectively rescale a photo forcing certain details to disappear. While the meta data would remain intact (foiling certain types of deception) a convincing faked photo from a validated source would undermine trust in the entire Archive.

Possible solutions include allowing some editing, but the validation system or app running on the user’s machine would return and display the original data when queried. So a cropped photo would not present a “green” light that the content is unmodified, but rather a “yellow” warning that when clicked, shows the unmodified original and a “green” status. Faking the material’s owner or location would yield a “red” light.

reporter could transmit and record an encrypted Bluetooth beacon that is part of a photo’s fingerprint. This would confirm both photos were taken at the same time, in the same place.

² The famous OJ TIME/Newsweek covers (see example section)

Gaming the system: The FACT Archive would expose the majority of fake content sites, as they employ relatively simple tricks to deceive. But, once the system is in place, more sophisticated attempts to deceive (by a smaller group of players) will arise. These include concatenating accurate quote snippets that pass the FACTS Archive test, into a combination that distorts the original meaning of the full quote. Using HTML 5 overlays to place a fake image “inside” a true photo, yet not triggering a hash alarm. Or denial-of-service attacks on the blockchain authorities.

So we expect the FACT Archive’s architecture will evolve in response. Thus, we place a premium on a flexible approach which learns as its grows, and can be initially fielded as a lightweight framework that evolves over time.

Open Issues:

- 1) How to migrate hash database when a new generation of block chain technologies are created?
- 2) Are private key authorities really secure?
- 3) Bulk upload of content databases (NYTimes archives, Getty Images, ..)
- 4) How to pay for service?
- 5) Is blockchain necessary- perhaps simpler key-based, shared replicated cloud might be satisfactory?
- 6) Are public keys required? A private key could be used to encrypt, and the blockchain miners act as authenticators.

Examples:

Fake press release to manipulate stock price



The image is a screenshot of a BBC News article. At the top, the BBC logo is on the left, and navigation links for News, Sport, Weather, Shop, Earth, and Travel are on the right. Below this is a red banner with the word 'NEWS' in white. Underneath the banner is a secondary navigation bar with links for Home, Video, World, US & Canada, UK, Business (which is highlighted), Tech, Science, and Magazine. Below that is a third navigation bar with links for Business, Market Data, Markets, Global Trade, Companies, Entrepreneurship, and Tech. The main headline of the article is 'Vinci shares plunge on publication of fake press release' in a large, bold, black font. Below the headline, it says '22 November 2016 | Business' and there are social media sharing icons for Facebook, Twitter, LinkedIn, Email, and a general 'Share' button. The main image of the article shows a large, curved, metallic structure under construction, which is the arch over the Chernobyl nuclear reactor. A red crane is visible on the right side of the structure. At the bottom of the image, there is a caption that reads: 'Vinci is co-leading the consortium building the arch over the defunct Chernobyl nuclear reactor'.

Misquoting Washington:

Manipulated Quote from First Annual Message to Congress (fake in **BOLD**) "A free people ought not only be armed and disciplined, **but they should have sufficient arms and ammunition to maintain a status of independence from any who might attempt to abuse them, which would include their own government.**"

Here is the actual text from Washington's speech, referring to militias and not individual gun rights:

"A free people ought not only to be armed, but disciplined; to which end a uniform and well-digested plan is requisite; and their safety and interest require that they should promote such manufactories as tend to render them independent of others for essential, particularly military, supplies."

Via <http://www.mountvernon.org/digital-encyclopedia/article/spurious-quotations/>

Validate political history:

Caption identifying Gay EU spouse changed by Whitehouse



Fake meeting between celebrities:



TIME/Newsweek covers (1994) adjusted skin color to make a point:



The wrong solution from China:

“Editors at China’s leading nationalist newspaper, Global Times, don’t often sympathize with the United States. So it was notable when the paper joined Americans last fall in scolding Facebook for spreading fake news. In an editorial titled “Western media’s crusade against Facebook,” the state-run paper argued that without government regulation — censorship, in other words — fake news, propaganda and rumor would spread disastrously across the internet.”

http://www.huffingtonpost.com/entry/united-states-china-fake-news_us_592494d5e4b00c8df29f88d7?ncid=inblnkushpmsg00000009

AMERICANS COULD LEARN SOMETHING FROM CHINA ABOUT DEALING WITH FAKE NEWS

The Chinese people have been wading through propaganda for decades.

By Will Ford
05/31/2017 05:45 am ET



DAMON DAHLEN/HUFFPOST; PHOTOS: GETTY