Artificial Reality: Immersive but Factually Dishonest AR Experience

Column: Ethics & Standards

Artificial Reality: Immersive But Factually Dishonest AR Experience

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***Abstract*—As commonly known, technology is a double-edged sword, and augmented reality (AR) is no exception. This article raises concerns and promotes awareness of the use of AR in mass media, in particular in those industries, such as news reporting, that aspire to report facts. Our main message is that the standard workflow for creating AR content, albeit having no mala fide intent, might lead to artificial reality. This titular term was introduced by the first author during a talk organized by a technical committee of IEEE Consumer Technology Society (CTSoc), where we decided that we should urge more ethics and standard discussions on the issue through this article.**

AUGMENTED REALITY (AR) is a natural choice for newsrooms. Since Apple and Google made AR accessible to the consumer market through its native support in iOS and Android, an increasing number of newsrooms have embraced this new technology. From global publications such as the New York Times[1] (NYT) and Washington Post[2], to regional newspapers such as the Los Angeles Times [1] and the Nihon Keizai Shimbun (a national newspaper in Japan)[3].

While there are ongoing debates around the business case for using AR in news reporting, the values this new technology could bring to the industry are evident. For example, AR can make abstract news content more tangible. This is especially the case when the news story introduces physical objects to their digital readers [1] (Fig. 1).

Figure 1. Los Angeles Times published their best-burger list in 2019 using a combination of AR models (left) and photos (right) [1].

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[1] https://nyti.ms/3xX4KNM
[2] https://www.washingtonpost.com/graphics/2018/lifestyle/amp-stories/how-to-use-augmented-reality/
[3] https://adweb.nikkei.co.jp/ar/lp/

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THE RISK OF ARTIFICIAL REALITY

As with any other early stage technologies, the ethical guideline for creating AR content is still being developed [2]. While some applications, such as creating gaming assets, are more tolerant to the ambiguity, it poses serious questions for fact-based news reporting.

For example, it would be scandalous if a photo editor publishes a photo that is heavily edited [3], but it is not an uncommon practice for an AR developer to repaint a 3D model to make it look "real", especially when the main selling point of using AR is an immersive and realistic experience.

In fact, when looking carefully, one will find conflicting information between newsroom ethics guidelines and what it would take to create an AR experience. For example, the Los Angeles Times[4] states that it does not "add color, create photomontages, remove objects or flop images". However, as Table 1 shows, this is nearly impossible to follow when creating realistic AR objects using current technologies (e.g., photogrammetry), which requires large amount of manual editing, such as painting colors and creating textures.

Since most newsrooms test AR technologies with less serious contents, such as food, sports, or lifestyle, not much attention has been paid to the potential negative impacts of this reporting technology. As immersive technologies mature, one can imagine using AR for more serious contents such as war or natural disaster reporting, in which case a misrepresented fact could cause huge damage to the reputation of a newsroom.

This leads to the main point of the article: ***Artificial Reality***, a new term created to describe the use of immersive technology to provide realistic-looking but factually-dishonest experience.

This risk applies to all AR experience based on the recreation of real world objects. This is because current processes of creating these objects introduce multiple touch points where the creator's own bias can affect the final outcome. However, today's newsroom lacks the expertise to understand, remedy, and properly inform readers about the potential risks.

We should note that Artificial Reality could be the result of well-intended purposes. For example, AR content creators are incentivized to make the AR model smaller through various optimization techniques so that it consumes less data when the reader loads it on their phone. However, as we will see in the next section, this process is heavily affected by the creator's own judgement. Without proper standards on acceptable modifications and optimizations in place, newsrooms could eventually find themselves to be in ethically challenging situations.

[4] https://www.latimes.com/la-times-ethics-guidelines-story.html

POTENTIAL ETHICAL CONCERNS WITH 3D MODELS OPTIMIZATION FOR AR

Generally, the workflow for creating AR contents usually starts with the acquisition of high-resolution artifacts of the element that have to be modeled and obtained directly from the real-world. In case of 3D objects, two common approaches are the laser-scanning and the photogrammetry [4]. The former leads to the generation of complex point clouds which also store the color information for each point, and hence it requires a further processing step to obtain a 3D mesh. The latter, which can be performed with relatively cheap equipment like smartphones or drones [5], consists in generating a 3D mesh and the relative color texture from a high number of images taken from various point of views around the real element.

In both cases, the result is characterized by high-objectivity, being the result of application of algorithms which tend to maximize accuracy (and, consequently, the fidelity) of their output. However, these artifacts are usually too complex to be directly integrated into a real-time 3D application like an AR experience. When it comes to the creation of 3D models for AR applications, the challenge is to find a good compromise between accuracy, details, and visualization performance [4].

To cope with these issues, a further processing step is then required. This is usually done by applying various techniques, the main goal of which is to simplify the result. However, this simplification can only lead to a quality reduction, since decreasing the amount of data that is used to represent a 3D model inevitably produces errors and deviations from the original shape [6]. An example is retopology, which recreates the topology of a mesh to make it cleaner and more easily manageable by the 3D engine, while trying to preserve a sufficient level of details [4].

Automatic and semi-automatic retopology algorithms (e.g. QuadriFlow [7]) can generate an output with a precision inversely proportional to the mesh complexity. Hence, the level of representativeness is only influenced by the choice of parameters operated by the content creator, and possible modifications

Table 1. How certain editing techniques are tolerated by two major U.S. newsrooms' editorial standard vs typical photogrammetry AR model development processes.

	New York Times Photography Guideline	Los Angeles Times Photography Guideline	A Typical Photogrammetry AR Model
Montage	Not mentioned	Prohibited	Often Required
Color adjustment	Minimally necessary	Minor adjustment allowed	Often Required
Remove objects	Generally not allowed	Not allowed	Often Required
Labeling practice for altered photos*	Label as "photo illustration"	Label as "photo illustration"	No labeling standard

**Specific definition and scope vary from newsroom to newsroom.*

derived from the application of the algorithm. These algorithms cannot always provide satisfactory output.

In that case, another useful method for obtaining the same result is the manual reconstruction of the 3D model [4]. This manual workflow is performed through 3D modeling tools (e.g., Blender), and consists in reshaping the original artifact while keeping the original and complex model as a reference, and exploiting the use of textures (e.g. color map, normal map, and detail map) to "bake" details that are inevitably lost in the process [4]. This second approach is heavily subjected to arbitrary decisions of the 3D artist who can decide to remove, add or modify details for various reasons. For the honest desire to improve the perceived realism of the experience (in contrast to malicious conducts like deliberate forgery), these edits are more or less acceptable to the AR community; however, they certainly pose challenges to the operating principles of newsrooms.

NEED FOR MORE ETHICS AND STANDARDS DISCUSSIONS

Soon in the future, an AR object might look just as real as a real world object via an immersive AR goggle. However, the more realistic the experience becomes, the greater the potential negative impacts of Artificial Reality will be. As more newsrooms embrace this new storytelling technologies, we believe now is the time to establish ethical guidelines on AR content creation, as we did for photos and videos several decades ago.

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