



ORAgen: Exploring the Design of Attribution through Media Tokenisation

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ABSTRACT

In this work-in-progress, we present ORAgen, as ‘unfinished software’, materialised through a demonstrative web application that enables participants to engage with a novel approach to media tokenisation – the ORA framework. By presenting ORAgen in ‘think-aloud’ interviews with 17 professionals working in the creative and cultural industries, we explore potential values of media tokenisation in relation to existing challenges they face related to ownership, rights, and attribution. From our initial findings, we reflect specifically on the challenges of attribution and ongoing control of creative media, and examine how media tokenisation, and underpinning distributed ledger technologies can enable new approaches to designing attribution.

CCS CONCEPTS

• Human-centered computing → Empirical studies in HCI;



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KEYWORDS

Ownership Design, Attribution, Rights, Media Tokenisation, NFT, DLT, GenAI, Unfinished Software, GLAM

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1 INTRODUCTION

Distributed ledger technologies (DLTs) have been envisaged as a transformative technology for the creative and cultural industries – with mixed success [11]. In particular, media tokenisation – where media and related metadata are recorded and associated with unique, non-fungible tokens (NFTs) – has been employed as a core approach to enable new means of recording attribution, enabling rights management and ownership of creative media [1]. During the NFT boom in 2021, tokenisation was primarily used to represent digital media as a speculative economic asset [13]. However, the potential applications of media tokenisation are far wider reaching, and require more critical attention from HCI and design research [1]. In particular, our research concerns applications of decentralised registries in media ecosystems to represent, record and share trusted information about media provenance and ownership (e.g. [5]. In the context of both traditional remix cultures and

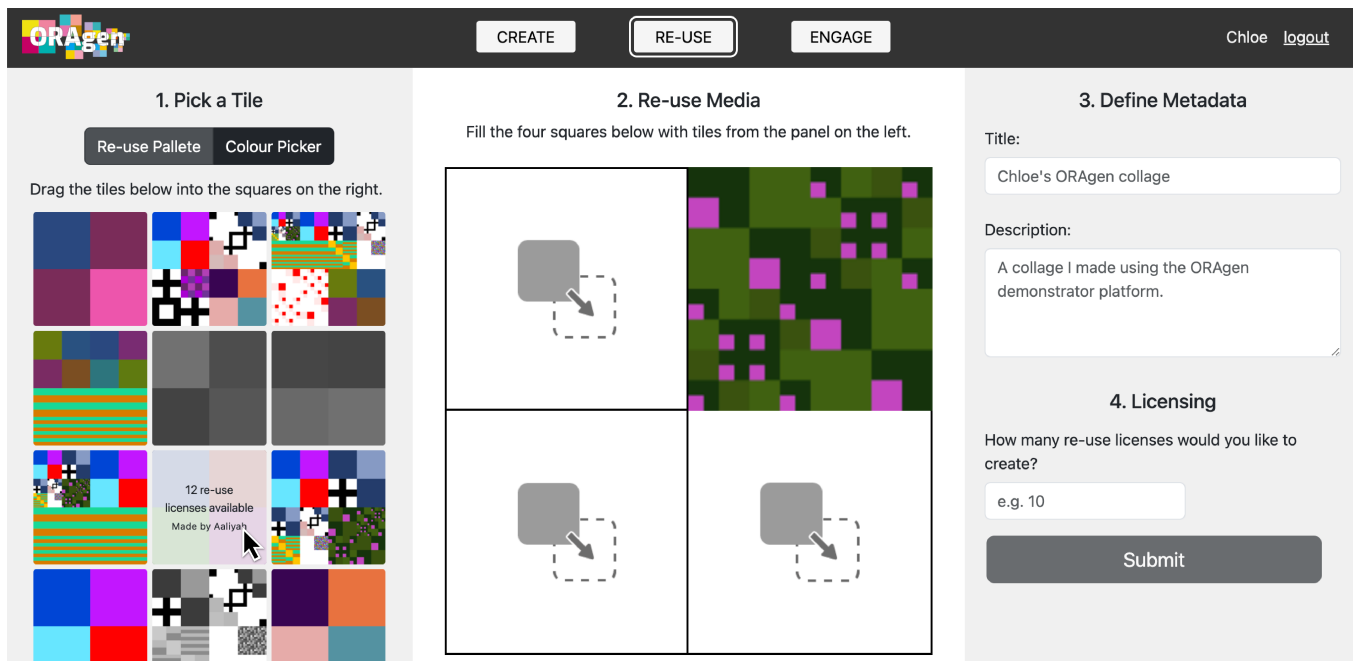


Figure 1: ORAgen reuse page

the emergence of Generative Artificial Intelligence (GenAI), media tokenisation could provide means to record, manage and enforce rights related to its use (e.g. [3]).

Existing platforms, such as *Verisart*¹, and *Arcual*², already use DLTs to create decentralised certificates of authenticity for artworks, providing artists with a catalogue of their work, and platforms in which to exchange and track sales. However, ORA (Ownership, Rights, Attribution)[2], a novel technical framework for media tokenisation, has the potential to extend these services by combining these tokens with attribution metadata using the C2PA[7] standard for content authenticity. This leverages DLTs to provide an alternative media ecosystem where two distinct NFTs are used to first represent an authentic media asset, and second as means to exchange ‘tokenised rights’ as licences, which can be tracked through associated smart contracts to identify how works are subsequently reused and engaged with.

What then are the opportunities and implications of media tokenisation to support digital media ownership, rights and attribution? Our ongoing research, employs the ORA framework directly as a lens to understand nuances around the *ownership* of digital assets via possession of non-fungible tokens; *rights* in the form of bespoke licences defined and issued by a creator; and *attribution*, through the immutable record of transactions and metadata in a distributed ledger. We aim to understand how the emergent technical features, qualities, and constraints of media tokenisation, intersect with the real needs and challenges that professionals in cultural and creative industries (CCI) face, and traditional legal and cultural interpretations of ownership, rights and attribution.

¹<https://verisart.com/>

²<https://www.arcual.art/>

2 THE ORAGEN DEMONSTRATOR

To investigate these questions, we designed and developed ORAgen (available at oragen.designinformatics.org) – a web application that instantiates and demonstrates the technologies underlying the ORA framework by allowing users to create, tokenise, licence, and remix simple colour collages. ORAgen has six, predefined demo accounts, each with an associated Ethereum wallet and licence contract. After selecting an account, users have the option to either create, reuse, or engage with the tokenised colour collages. Each of these features is described below:

- *Create*: users select colours and drag them onto each of the 4 tiles to create a simple collage. After entering basic information about their artwork (metadata), and selecting the number of reuse licences to issue, they can then tokenise (mint) the collage and licences.
- *Reuse*: identical to the create feature except that users have the option of re-using media created by previous users. To do so, users click on the reuse palette and hover over different media to view the original creator and licence availability (see Figure 1). If licences are available then they can drag the media onto their reuse collage.
- *Engage*: users can explore all of the media objects created by previous users. By hovering over a collage they can see its creator, date of creation, and remaining number of reuse licences. By clicking on the media they can view its provenance in the form of a visual ‘family tree’, showing the origin of all the different media that were used to make up a specific media object.

ORAgen serves as a technology probe[8] - a form of prototype to stimulate discussion on potential use. The demo is designed to

communicate the central concepts of media tokenisation and ORA without steering participants toward a particular narrative or goal, leaving space for them to imagine how it might be applied in other contexts. We also consider ORAgen to be *unfinished software*[10], as it provides a simplistic experience of a complex system, surfacing infrastructural qualities, which may be integral to the type of practices and the values it embodies.

3 PRELIMINARY STUDY

3.1 Method & Data Analysis

The initial stage of this research consisted of an exploratory interview study (led by Author 1) with professionals working in the cultural sector, in particular “GLAMs” (galleries, libraries, archives, and museums). 17 participants were recruited through professional mailing lists and networks, including curators, artists, managers of digital collections, as well as experts in copyright and digitisation of museum collections.

Semi-structured interviews were conducted via Zoom, each lasting around 30 minutes. Participants were initially introduced to the project and demo, and invited to ‘think-aloud’ (TA) as they interacted with ORAgen for the first time. Following this, the interview took an open-ended approach to invite participants to reflect on challenges they faced in their day-to-day work, related to attribution, ownership, and rights, which could then be mapped and related to specific features of the ORAgen demo. Interviews were recorded and transcribed using Zoom, with manual corrections. A reflexive thematic and inductive approach to coding was undertaken [4] to construct potentially salient themes. The data was reviewed with the wider research team in a second round of more deductive analysis refocusing attention on the challenges associated with creating and managing different kinds of media, and the features of ORAgen that were relevant to these challenges.

3.2 Findings

The interviews surfaced numerous concerns and approaches to attribution, ownership, and rights. In this shorter paper format, our findings will focus primarily on attribution, especially when sharing creative and cultural work online. Our findings reveal how attribution is important because creators employ it to gain a perceived control over their media, and show how ORAgen served to extend reflections on how attribution could be designed and employed.

3.2.1 The Value(s) of Attribution and Risks of Sharing Online. Attribution plays an essential role in building reputation for both individual creators and cultural organisations (COs). Several organisations discussed the transition to open licensing for their out-of-copyright digitised works, also known as “OpenGLAM” [9]. As P3 explained, while there is no obligation to attribute with open licensing, they embed attribution so that users know where the work originated, so that; “*we would gain a reputation for allowing our works to be used*”.

Unsurprisingly, our interviewees also reported that despite enabling much wider public engagement, Creative Commons licences could not assure attribution, which can often be “dropped off” when reused or shared onwards. Furthermore, COs have little resource to

police violations, but use other methods such as watermarking or sharing images in low resolution to regain some agency. However, participants viewed these as labour intensive and in some cases ineffective if they wanted to simultaneously encourage reuse.

For artists, attribution can discourage misuse, as P14, a freelance designer explains; “*for people in my position where you’re creating assets that could be purchased, attribution would act more as a sort of buffer against people using your stuff in the first place, so it’s more going to be a sort of theft prevention.*” This highlights how attribution is part of a social agreement that the work should be used within specific conditions. Likewise, four of the interviewees from COs discussed themes such as “duty” and “guardianship” in regard to sharing cultural collections online, while ensuring that it is not used in a derogatory way. For example, P16 described an experience where a photographed mummy, entirely prohibited from promotional use, appeared on stock image catalogue *Shutterstock*. Though the museum was able to resolve this case, it reveals the unique challenges that COs face in stewarding cultural value online.

Artists, such as P14, identified a systematic problem in regard to how platforms such as TikTok actively encourage “stealing” and “farming” of content through reuse. These concerns evidently extend to GenAI, a topic raised during six of the interviews. P6, a freelance artist, described how they are happy for other artists to remix their work with attribution but would not choose to provide work to AI models. More broadly, this also indicates the potentially limited value of attribution in isolation, as noted by P14; “*that’s going to do absolutely nothing for me realistically all that would give me is just some kind of gratification*”.

3.2.2 Maintaining Control and Tracking Reuse. Tracking how a work is being reused can offer a sense of control to creatives and COs. Emphasising this idea, P10 references a collection project which encouraged users to register to use an API to engage with a CO’s digital collection. In so doing, the organisation could track who was using what and where. However, P10 went on to say that this only provides a “*perceived control*” rather than “*absolute control*” as tracking is limited to the CO’s website.

This point resonates with P6’s reflections on provenance data, which highlights how this could have positive “*ripple effects*” among artists by connecting individuals, and negative implications as artists can identify how others are using their work but cannot necessarily do anything to stop others from using it without permission. As such, attribution provides a sense of control, but cannot provide creatives with “absolute” control over their work.

In summary, our initial findings highlight *why* attribution matters, especially in moral terms, and the aspirations for attribution to enable creators and intermediaries to gain and maintain greater control of creative and cultural work as it is shared more widely. We turn now to consider in more detail *how* media tokenisation, and ORA specifically might support these aspirations, understood by participants through specific interactions with the ORAgen demo.

3.3 Extending Attribution through ORAgen

3.3.1 Integrating Attribution into the Creative Process. ORAgen enabled participants to experience and reflect on attribution during the creative process of remixing media, as it makes attribution and metadata visible in a way that it becomes *part of* reusing and

sharing. Participants spoke positively about the efficiency of this joined up practice. From a CO perspective, P3 drew a contrast to their current laborious practices in managing licensing: *“it’s quite intensive where you have to work out what people want. You have to issue them with a licence. I have to draw up invoices. I have to go to the finance department.”* Labour is also required in making sense of disparate information, dealing with lost attribution or multiple licences with different clauses, as noted by P1 when discussing the issues of licence logic in collections (where the terms of multiple licences applied to one work over time contradict each other); *“And I guess that’s what’s really interesting about this [ORAgen] right, is that you’re linking that altogether.”*

Creatives also discussed the difficulties of applying attribution after work is produced, for example P6 reflected on their process of applying attribution only if they know they are going to publish a project whereas if it is a personal project; *“I’m less concerned about where all of my sources come from in terms of being able to credit them”*. What’s clear is that significant effort goes into getting attribution “right” and even has an impact on the final work produced, when it has to be dealt with in isolation from the creative process.

3.3.2 Viewing Attribution as a Creative Material. Attribution may also have a direct creative impact on a work. In the interviews this is evidenced by the idea of “riffing” noted by P7 who described a project of theirs which encouraged other artists to experiment with a template of their work to create iterative and evolving pieces. As P7 explained, the *“original traces of each artist”* could be seen as the piece changed over time, highlighting how attribution is part of the evolution of the work. ORAgen has the potential to extend this practice through provenance data, which could trace the evolution and shifting of an idea, while showing how the essence or ‘aura’ of the original remains intact.

3.3.3 Visualising Attribution through Provenance Data. This last point relates to how ORAgen provides a way of visualising attribution. In the demo, this is represented as a hierarchical family tree for each artwork, which visualises the complex networks that are combined in a colour collage. This reveals the collective nature of making, which P14 described as having a “DNA” element to it as it showcases the different influences that come to define an evolving work. As such, provenance data is not only part of the creative process, but has the potential to emphasise the interconnected nature of creativity.

P7 also reflected on how provenance data could have practical applications in COs when used in the logistics for lending cultural collections. While this practice would be reliant on the connection between the physical artefact and digital twin being maintained, it also proposes how provenance data could provide valuable insight into the creative, temporal, and spatial histories of an artefact, with ORAgen creating a visualisation of what would otherwise be invisible relations between people, places, and things.

3.3.4 Coping with Complexity and Extending Relations. Participants talked about how complexity in managing attribution develops. In part this derives from current disconnection between works and their original metadata – which ORA and C2PA help to resolve, though much complexity or ambiguity in attribution is inherent

in the nature of creative production itself. Participant 2 expressed the importance and difficulties of recognising everyone in collaborative artworks. ORA may not be able to address the tensions in shared work, but could assist in recording and tracking some of this information if its use is integrated into a shared creative workflow. Through this, the provenance data becomes a journey of collaborative labour, documenting both process and accountability as the work unfolds.

Embracing complexity, others saw the potential for networks of attribution to develop the visibility, reputation and reach of an artist as they build and demonstrate connections across a community. This amplifies the relationship between attribution and reputation identified previously, and suggests how the technology can be a way to digitally bind artists to collectors and audiences. For example, P9 noted; *“When I look at a new project, [...] I tend to check who the collectors are. And if there’s names that I remember from other projects I would be more interested”*. This particular reflection came from looking at the attribution in the “reuse” mode of the demo, and points to how attribution might be leveraged to reflect a social network between collectors and artists in the NFT ecosystem. Similarly, ORAgen could be a digital infrastructure that makes visible the social relations that bind and build a creative ecosystem.

4 FUTURE WORK TOWARDS DESIGNING ATTRIBUTION

Our initial findings demonstrate the rich potential design space in leveraging media tokenisation to render attribution as something *to-be-designed* with. We briefly elucidate some possibilities and implications here.

Through a closer binding of metadata and attribution with the various media being created and re-used, decisions related to attribution can become much more closely integrated with a creative process. In a visual interface, such as the ORAgen demo, there are opportunities to surface attribution when searching, browsing and choosing prior works to remix. For example, one could encourage remix of works which were the most or least popular; or surface relationships to other creations already being used in a new work. Attribution is not only authorship; with ORAgen, a creator can embed all kinds of metadata into a work. This includes authorship, but could extend to other qualities, such as time, date and location, the specific hardware used by the creator, colour hex codes, and any other tagging or description to communicate artistic intent. In different contexts and mediums, we should consider how directly a creator should be made aware of this metadata being created, and when during the creative process. This could be highly automated, and seamless (such as when saving or packaging a file), or more directly foregrounded, in the ways that Desjardins [6] and Odom [12] critically design new encounters with metadata.

The provenance and relationships between works in ORAgen is shown in a basic family tree structure. Clearly, there are more nuanced and complex ways in which this data could be visualised to support attribution. We might consider how to surface certain details about attribution to enable building and extending connections between works, creators and audiences. At the same time, given the potential complexity of provenance relationships – how

can this be simplified, aggregated or summarised effectively – for creators, intermediaries and audiences?

As a work-in-progress, these remain initial prompts to illustrate the design space. Practically, to explore these questions, and others related to how media tokenisation further enables bespoke licensing and ownership, we are planning to develop these design features in ORAgen further and deploy the software within a cultural context – such as a museum foyer or festival setting. Through this, we aim to explore the possibilities using this technology to form connections through ongoing reuse, including AI training data and other emerging trends in creative practice.

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