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A Mediography Of Virtual Reality Non-Fiction: Insights And Future Directions

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Abstract

The emergence in recent years of consumer-accessible virtual reality (VR) technologies such as the Google Daydream, Oculus Rift and HTC Vive has led to a renewal of commercial, academic and public interest in immersive interactive media.

Virtual reality non-fiction (VRNF) (e.g. documentary) is an emergent and rapidly evolving new medium for filmmaking that draws from - and builds upon - traditional forms of non-fiction, as well as interactive media, gaming and immersive theatre.

In this paper, we present our ongoing work to capture and present the first comprehensive record of VRNF - *a Mediography of Virtual Reality Non-Fiction* - to tell the story of where this new medium has come from, how it is evolving, and where it is heading.

Author Keywords

VR; mediography; non-fiction; documentary.

ACM Classification Keywords

• **Human-centered computing~Virtual reality**   •
Applied computing~Media arts.

Introduction

Recent years have seen a surge of interest in virtual reality (VR) as a platform for non-fiction. From Nonny de la Peña's experiments in "immersive journalism" [9] to Google-funded projects at *New York Times* and *The Guardian*, journalists have been exploring the conceptual and technical potential of VR non-fiction for several years. Likewise, mainstream filmmakers such as Kathryn Bigelow, as well as broadcasters such as the BBC, have begun to embrace immersive technologies in their non-fiction media production practises. Since the release of the Oculus Rift DK1 in 2014, there has been a steady increase in VRNF projects. This is reflected in non-fiction categories appearing on VR distribution platforms and immersive media festivals (e.g. *FIVARS*). VRNF is also becoming a staple of established film festivals including *Sundance* and *Tribeca*.

The emergence of VRNF presents many challenges and opportunities for researchers, designers, developers, broadcasters, producers and curators of digital media alike. A key challenge across all of these sectors is the need for a deeper understanding of the principles and parameters of this nascent paradigm [18]. In this paper, we present our ongoing work to capture and present a comprehensive record of this new form of interactive experience; to tell the story of where it has come from, how it is evolving, and where it is heading.

Background & Related Work

VR is attracting widespread multi-disciplinary research interest. There is a corresponding groundswell of research into VRNF, particularly into ways that affordances of VR - "presence" [e.g. 11, 9, 4, 1, 13], "immersion" [e.g. 5, 10] and, perhaps, "empathy" [e.g. 16, 2, 17] - enable new kinds of non-fiction narratives

and experiences. In online spaces, journalists, experts and the general public routinely dissect new developments and releases across a wide spectrum of VR genres [e.g. 19]. However, this online discourse is piecemeal, unstructured and subjective. There has been no systematic examination of the growing corpus of VRNF. Informed by [6], we argue a more systematic approach would be valuable across sectors and research disciplines. We have therefore created a database of VRNF and are developing an associated set of visualisations that illustrate the formal, thematic and technical trends in the growing corpus of VRNF.

A number of existing projects have informed our work. MIT Docubase [12] is a curated collection of ~300 documentary works (including a number of VR pieces), with associated metadata including, 'technologies' (e.g. *Depthkit*) and 'techniques' (e.g. *volumetric capture*). The Internet Movie Database (IMDb) [8] is a semi-moderated online database of video content, covering ~5m film and television productions, but (as yet) few VRNF pieces. The IMDb collects substantial technical metadata (e.g. camera details), but does not collect information on design techniques. Finally, the International Documentary Film Festival Amsterdam (IDFA) maintains a database of its own selected works [7]. This includes immersive / VR pieces, amongst a range of other interactive documentary forms.

While our work shares a number of characteristics with these projects, it differs in two key ways. *Firstly*, our focus is exclusively on VR non-fiction works, and a major contribution of our work is mapping how the unique affordances of VR are approached in the construction and design of the content itself. *Secondly*, our objective is to compile a systematic, historical

record of VRNF, from the earliest known example. Our scope is also wider in that we collect not only the high-level metadata of each title (title, director, release date etc), but also detailed information about its structure (e.g. visual cues, interactivity, use of audio, CGI etc) and form (e.g. distribution platform).

Methodology: "Mediography"

We have characterised this work as 'mediography'. The intended interpretation of this term is essentially analogous to 'bibliography' (i.e. *a history and systematic description of texts*), but recognizing more explicitly the nature of the content of study. In this section, we describe our inclusion criteria, search strategy and the scope of our cataloguing system.

Inclusion Criteria
Our inclusion criteria are twofold. The first considers how the content is presented (*is it VR?*). The second addresses whether or not a particular title is non-fictional (*is it VRNF?*).

To the first point, we acknowledge that the use of a head mounted display (HMD) is not essential to an immersive VR experience. However, as our research concerns the most recent wave of consumer VR technologies, we are restricting the scope of the content we are examining to panoramic visual imagery that is presented for viewing within a HMD. The most frequently encountered example of this is 360° or 'spherical' video content.

To the second point, the line between fiction and non-fiction is a fine one [14]. Our initial review of the VRNF landscape revealed many short (~10mins), linear 360° video pieces. These works are relatively easy to identify and catalogue, as they closely resemble contemporary 2D documentary or journalistic works. However, there is also a proliferation of non-linear, CGI and interactive works that are less immediately recognisable as 'non-fiction'. For example, *Home - an Immersive Spacewalk Experience* (2016) is an interactive simulation of the International Space Station that - while based on a real environment and the people who work there - uses artistic license and game mechanics to provide a more interactive educational experience. Other works like *Notes on Blindness - Into Darkness* (2016) use artistic CGI to represent physical phenomena in different modalities. This formal diversity and the new affordances of the medium mean the line between fiction and non-fiction can be particularly fine.

Acknowledging that these definitions are both nebulous, we have adopted a broadly inclusive approach. We therefore include any piece that satisfies our technical criteria, self-presents as being non-fiction (e.g. 'journalism', 'documentary' etc.), or is referred to by an independent third party as VR non-fiction.

Search Strategy
Distribution channels for VRNF include media aggregation websites (e.g. *YouTube*), and platform-specific 'apps' (e.g. *Oculus Store*). In addition to reviewing the VRNF content from each of these channels, our search strategy includes organic keyword search via search engines and social media (keywords: 'immersive', 'vr', 'documentary'). Finally, we are reviewing the programmes of international festivals (e.g. *Tribeca*), along with VR / technology-focussed publications such as *Engadget*, *VRFocus* and *Wired*.

App stores: The platform(s) from which a VRNF title is distributed (e.g. *Guardian VR*, *Oculus Store*, *Within*).

Film Festivals & awards: VRNF titles are increasingly visible in the programming of international film festivals, with titles often appearing at multiple venues. We capture where a given title is world-premiered, and every subsequent festival appearance.

Countries, directors & producers: VRNF titles can (and often do) have multiple directors, producers and countries of origin.

HMD platform(s): VRNF titles can be multi-platform, exclusive to one platform, or limited by technical requirements to a specific *set* of platforms.

Content: Refers to the internal composition of the title. See subsection "content tags".

Figure 1: Summary of additional title metadata captured in the Mediography

Metadata: What are we Capturing?
VRNF is attracting input from a diverse range of people with backgrounds in filmmaking, theatre and video games development amongst others. As a consequence, what constitutes 'best practice' in VRNF is the subject of rapid evolution and re-evaluation as practitioners collaborate and experiment.

To ensure our work is of value to the TVX/HCI communities, we felt it essential that the design of the Mediography be capable of cataloguing high-level metadata (e.g. release date, director etc), but also a wide range of details relating to how the content itself is designed, produced and presented. In this regard, we are drawing on insights such as [3] that observed that best practices for techniques such as subtitling are yet to be established in VR. To this end, our database was designed from the outset to be flexible and extensible, allowing us to quickly expand the scope of our capture as our investigation develops.

Database Structure
The Mediography is a relational database, developed using the *Django* web development framework. At the core of the database is the 'film' table that stores the basic metadata for each title, including {title}, {url}, {duration} and {release date}. Supplementing this, a number of tag-based fields are stored in separate tables via many-to-many relationships. This design decision offers a number of advantages. For example, as well as new tags, it facilitates the rapid development of taxonomies through reusable tags. We can also expand these tables further with context-relevant additional fields as required. The additional tag-based tables are summarized in Figure 1.

"Content" Tags: Capturing the Construction of VRNF
A major contribution of the Mediography is that we seek to capture the techniques used to craft VRNF, both as they emerge and as they spread and evolve over time. Some of these techniques reflect technological affordances, while others reflect creative decisions. To ensure our tags are as comprehensive as possible, we are working with multiple stakeholders including an interdisciplinary research team and professional VRNF producers. While remaining a work in progress, we have currently identified 50 techniques, examples of which are presented in Figure 3.
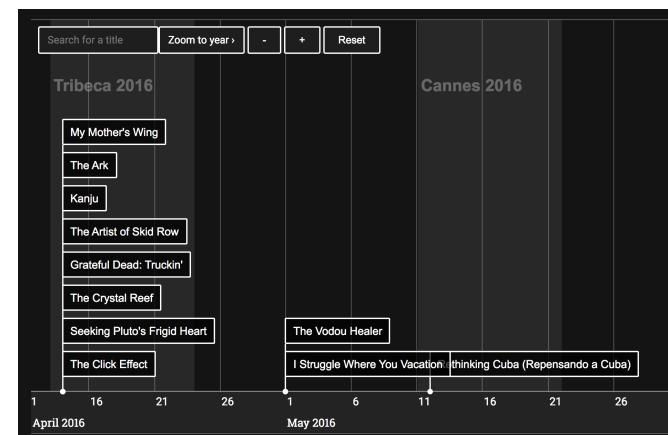

Figure 2: Prototype Mediography timeline UI.
http://vrdocumentaryencounters.co.uk/vrmediography/vrmediography

Design of the Mediography UI
Supporting the database is a web-based UI [19] that provides a public-facing means of exploring the data interactively. A key feature is an interactive timeline (Figure 2), which orders titles by date of

Subjective View: Point-of-view (viewer is an 'actor' within the scene).

Virtual Physicality: E.g. visible arms or body, casting of shadows, visible breath etc.

Diegetic Annotation: E.g. text / maps / 2D screens / projections that are mapped to surfaces within a virtual scene (as opposed to a non-diegetic overlay).

Visual / audio prompting: Cues that explicitly guide viewer attention, such as arrows or spoken instruction.

Nonlinear narrative: e.g. branching narrative structure.

Figure 3: Examples of the content 'tags used in the Mediography. These tags capture specific technical and / or design features of individual VRNF titles.

release, highlights award-winning pieces and indicates whether a piece was world premiered at a film festival.

A web-based platform provides a number of advantages. It provides accessible and up-to-date analytics based on live data, as well as showing how these factors have changed over time. It also enables stakeholders to highlight missing or inaccurate content.

Initial Findings and Tensions

While still a work-in-progress, our current dataset includes > 230 VRNF titles from 2012 to the present day. We have therefore been able to observe certain trends, tensions and issues from 2012-2017 (inclusive). Here, we highlight some of these initial observations.

Is there an appropriate duration for a VRNF piece?
Calculated across our whole dataset, the average duration for a VRNF piece is 8.7mins ± 0.3min (n=232). However, yearly averages have yet to settle, with values ranging from 7–12 minutes. While these durations align loosely to the film 'short' format, we also note that there currently exists little guidance on how long audiences are willing to spend viewing VRNF content. Though more research is required, the limited variation in durations we have observed might indicate a lack of confidence on the part of filmmakers to push the boundaries of the medium with longer pieces.

Towards a 'Shared Grammar' for VRNF
Through assembling the mediography, we have come to recognise that an exciting affordance of VRNF lies in its ability to mix traditional non-fiction media-making practises with other (traditionally fiction-focused) practises - such as games and theatre - in increasingly novel ways. Indeed, many of the most awarded VRNF

projects to-date present unique configurations of elements (e.g. *Spacewalk*, which combines game elements and documentary conventions in a non-linear narrative). As this convergence continues, we anticipate that there will be an increased need to identify the language that is emerging to describe VRNF content production, with particular attention on a number of terms currently used by previously independent disciplines that may now be sources of potential misunderstanding (e.g. 'diegesis', 'presence', 'empathy' etc).

Next Steps

The focus of our current work is the completion of our content tag framework, and the collection of all VRNF titles released before 2018. We will then apply our framework across the corpus to conduct a deeper analysis of the VRNF content; an activity that will form the basis of a full paper that will detail the 'story so far'. In parallel, through this detailed examination of the VRNF landscape, we will seek to identify areas where research interventions may be most fruitful, and inform the design of a number of experimental VRNF commissions that will be developed in collaboration with our project partners over the next 18 months.

Acknowledgements

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