Informing the Digital Archive with Altmetrics

Ashley L. Taylor, University of Pittsburgh
Lauren B. Collister, University of Pittsburgh

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Abstract

Altmetrics can be used to understand impact beyond citations, particularly for digitized collections. As cultural institutions look to pursue more active engagement with communities of practice, altmetrics help archivists understand the conversations happening in real time that will allow them to provide access to the most relevant materials. Through the use of case studies, we aim to demonstrate how applying altmetrics while considering the curation of digital collections can allow archivists to stay engaged with target communities outside traditional channels, demonstrating both the applicability of altmetrics to legacy scholarly work and the value of digitization as an access method.

Ashley L. Taylor is an archivist in the Archives & Special Collections at the University of Pittsburgh Library System. In her role as co-chair of the Digital Library Federation's Born-Digital Access Working Group, she is interested in exploring the role of digital records in the archival community. Email: a.l.taylor82@gmail.com

Lauren B. Collister (Ph.D. Sociolinguistics, University of Pittsburgh, 2013) is the Director of the Office of Scholarly Communication and Publishing at the University Library System, University of Pittsburgh, where she oversees the altmetrics, copyright, publishing, and repository programs. Email: lbcollister@pitt.edu

Introduction

Engagement with archives has evolved as archival work trends toward digital collections, which have more potential to reach those users outside traditionally narrow concepts of academia and "researchers." In the world of traditional analogue reading room research, certain user groups were assumed to be target audiences, depending on the nature of the repository. Historical societies attracted more genealogists and local historians, whereas academic repositories were more heavily

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trafficked by postgraduate students and professional researchers. Repositories with a more specific scope, such as architectural or medical libraries and archives, catered specifically to an ever-narrower subset of these research populations. Demographic studies would typically confirm these assumptions, resulting in outreach efforts and collection development centred on these established and visible communities.

With digital tools, libraries and archives have an opportunity to discover and engage new groups of people who are interacting online with digital collections, identifying new communities of users. These new communities of users for digital collections may include such groups as Wikipedia editors looking to strengthen their articles, marketing and social media editors looking for images and new information to add to their Twitter feeds, interest groups debating politics and philosophy in online forums, and online activists advocating for causes using technology.

Archivists want and need to be responsive to these communities; to do so, they need the tools and resources to identify the communities and connect with them. Altmetrics help archivists begin to understand the conversations happening in real time in expanded communities. This understanding will help them choose the most relevant and useful materials that can contribute to those conversations and foster online connections with distributed user communities that may never physically visit the archives. Applying altmetrics while considering the curation of digital collections can allow archivists to stay engaged with target communities outside traditional channels, demonstrating both the applicability of altmetrics to legacy work and the value of digitization as an access method.

Literature review

Digital collections

For the past 20 years, archival institutions have increasingly focused on digitization as a means of providing access, performing outreach, and, in some cases, preserving materials. Prominent and prescient archivist F. Gerald Ham (1984) noted as far back as 1984 that electronic archival records would constitute one of the profession's largest hurdles, bringing attention to the need for curatorial and infrastructural planning as a key to managing these materials responsibly. A host of considerations accompany every decision about whether or not analogue archival content can or should be made available online. Copyright, physical condition, and researcher demand all play a role, but so does the presence of a reliable digital content management system, extensive description and metadata schema, and a means of providing secure access to authentic documents. Born-digital archives present many of the same problems, with added concerns around the preservation of and access to varied file formats, antiquated hardware and software, and privacy and confidentiality issues. Access to born-digital collections is something that has come to be explored at a slower pace, with relatively few community resources available (Appel, Clemens, Hagenmaier, & Meyerson, 2015).

Building digital collections requires an enormous amount of effort and dedicated resources, so the selection of materials should always consider potential use cases and target communities. In the 1990s and early 2000s, many digitization efforts focused on straddling the line between digitization as preservation and efforts to reach a wider

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network of users by selecting materials with high intrinsic research value, a complicated relationship described by Abby Smith (2001) in report for the Council on Library and Information Resources. However, with the development of new areas of digital scholarship, such as data mining and digital humanities projects, archivists are increasingly confronted with users wanting to see more than just a JPEG image. They also want the metadata, which allows them a deeper understanding of context as well as content.

In addition, particularly when the format of digital material is integral to the understanding of the object (for example, in the case of digital art projects), the ability to interact with the technical object itself is a key part of utilizing the record. There have also been initiatives, notably the Collections as Data project, to encourage archivists to consider making their collections accessible in a computational way, allowing researchers the opportunity to manipulate the material for purposes such as data visualization, text mining, and a host of other digital humanities and scholarship purposes. As scholarship evolves, so too must the types of archival records provided, as demonstrated in research studies (Kim, 2018; Walsh, 2017). This requires an understanding of the targeted communities, which are also expanding as the archival profession looks to diversify its traditional audiences.

Archival trends toward active community engagement

While many archives strive to be open to the public, the stereotypical view of academic repositories in particular as dust-covered ivory towers persists. However, particularly over the last decade, the archival profession has begun to take a more community-oriented approach to its outreach and engagement strategies. The increasing use of digital collections, which helps break down the traditional barrier of location-based accessibility, helps many institutions bring their collections to a wider audience and attempt to diversify the targeted communities within their reach (Patterson, 2016).

Dialogue has recently emerged that challenges the traditional assumption of archivists as neutral, passive voices, collectors of only the records of prominent individuals, corporations, and institutions. Part of this conversation within the profession grapples with a lack of diversity, both among archivists themselves and the types of papers that are collected. There are those who advocate for a more community-focused approach, what Sofia Becerra-Licha (2017) calls "participatory and post-custodial approaches that seek to shift curatorial authority and access to the communities represented" (p. 90).

An increasingly technologically literate population is empowered to make archival collecting personal and immediate, with professionals encouraging participation from something as simple as crowdsourcing identification for old photos to developing specific archival collections around movements such as Occupy Wall Street, Black Lives Matter, and the Women's March on Washington. Documenting the Now offers professional tools and guidance for the real-time social media archiving of socially significant events. These efforts seek to make the archival record more populist: a product of the participants rather than something "selected" by those in a position of power (Thiemer, 2014). Where traditional "scholarly" academic researchers have long

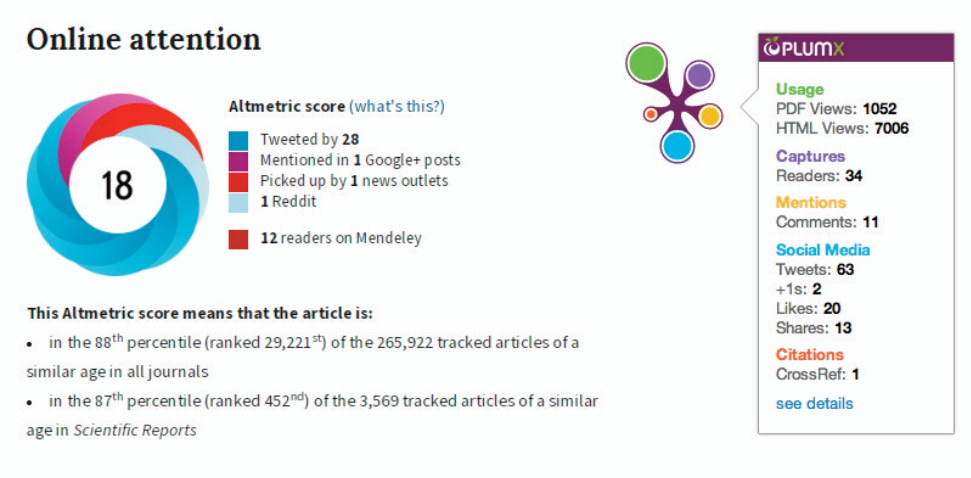
been the prioritized communities of practice in archives, many in the profession are seeking to expand their reach much further.

Altmetrics

Altmetrics, a blend of the words "alternative" and "metrics," measure the use of a work beyond the scholarly community, typically shown by citation counts. Altmetrics track the informal and social attention given to an article (Cronin, 2001; Priem, Piwowar, & Hemminger, 2012), including measures of downloads and bookmarks, social media mentions, and references in news articles, blogs, and outlets such as Wikipedia. These uses can be scholarly in nature, for example, scholars sharing interesting articles, and they can be instances where a broader community is using scholarly work, for example, activists sharing research on Twitter as part of a discussion of their work.

There are three main services that provide altmetrics at the time of this article's writing: ImpactStory, Altmetric, and Plum Analytics. Altmetric and Plum Analytics both offer institutional subscriptions for groups, such as universities, or funders to track the output of their organizations; they also offer widgets that typically appear on a published article showing its altmetrics. Altmetric scores appear on many journals as a colourful donut image, while Plum Analytics measures often appear in a flower shape called a Plum Print (see Figure 1). ImpactStory is directed at individual users; people can open an account to track their own work and make their own portfolio. Other services that provide altmetrics include the open source tool Lagotto, which provides Public Library of Science article-level metrics, and PaperBuzz. Regardless of the provider, all altmetrics services collect similar measures, although some providers may specialize in certain measures or offer different views of their output. For a full discussion of the tools and resources to collect these metrics, see the work of Stacy Konkiel, Michelle Dalmau, and David Scherer (2015) and Elizabeth Joan Kelly (2017).

Figure 1: The Altmetric "donut" (left) and the Plum Analytics Plum Print (right), as they appear on article abstract pages



Altmetrics have typically been used to measure engagement with scholarly articles, but, because of the usage they track, altmetrics can also be used for work beyond an article or book using similar infrastructure. Typically, altmetrics are tracked using a DOI,

handle, or a stable URL. If items in a digital collection or archive have these attributes, altmetrics can be tracked for them as well. Information from altmetrics can be used to demonstrate the value of a collection as well as help with decision-making practices about a collection. An example of using metrics in this way includes collecting information about the online use of digital collections on scholarly and non-scholarly websites (Konkiel, Dalmau, & Scherer, 2015). Konkiel and colleagues (2015) list 14 recommendations for metrics that are useful for digital collections in particular, which Kelly (2017) describes in further detail. These metrics are listed in Table 1. These metrics, according to Konkiel and colleagues, are the ones that are commonly tracked and that may have some information to offer about the usage of a collection. However, users intentionally gaming the system by repeatedly visiting a site, multi-tab browsing to increase a visit's length even if the user's eyes are not on the page, and increased "noise" in the system from automatic harvesting and bots are some limitations to the use of these metrics.

Table 1: The 14 metrics useful for digital collections and the information they offer

Metric name	What the metric indicates.
Page views	Time spent on a site and the content that is consumed.
Visits	Returning visits, ongoing engagement with a repeat user.
Referring sites	Citations and references in context, scholarly and non-scholarly.
Downloads	Akin to circulation counts, downloads show the successful exposure of an item.
Direct links	Indicate direct sharing from user to user.
Shares	Content circulation in a network, may signal implicit endorsement.
Saves/favourites/ bookmarks	Capture interest in a given item, using an item in a bibliography.
Adaptations	Reveal derivative works made from content.
Requests for content	Potential indicator of later citations, reuse, adaptations. Mostly collected on an ad hoc basis by email, but may be automated.
Citations	Use in a scholarly context, e.g., articles and books.
Visitor demographics	Interest in collections from particular groups, may lead to community engagement.
Mentions Context of a	Discussion; mentions show who is talking about an item.
Reviews and comments	Evaluation of content; the identity of commenter or reviewer may lead to community engagement.
Reference enquiries	Justify the allocation of staff time; they show interest and potential issues around collections.

Note: Recommended by Konkiel, Dalmau, & Scherer (2015).

Examples

Kelly (2007) wrote that "Archives may also find that they can improve other services by using altmetrics to influence decisions about accessions, digitization, and processing priorities, as discussion of user wants and needs in these areas may already be

occurring online" (p. 7). This section provides some examples of the use of metrics that have led to decision-making about digitization and digital collections, and the user communities that have impacted those decisions. These examples are by no means exhaustive, but are meant to illustrate how the different uses of metrics can lead to engagement with communities beyond the typical communities of practice for archives.

Coroner case files

As methods of scholarship evolve over time, archivists may find that a researcher's use of collections changes form. The Allegheny County Coroner's Office Records collection in the University of Pittsburgh's Archives & Special Collections (A&SC) demonstrates one such case. The nearly 900-box collection contains 89 years of reports filed by the coroner's office pertaining to inquests into unknown, accidental, or criminal deaths. The reports include data such as location and cause of death, personal information about the deceased, and testimonies and legal statements. The collection has long been among the A&SC's most heavily used and has historically been very popular with genealogists. Researchers attempting to find official documentation of the fates of their relatives use the coroner files often.

The A&SC staff saw this collections' potential beyond individual research from the beginning. The archivists were curious about what the data could reveal in terms of the city's medical and socioeconomic history; would one be able, for example, to trace the spread of the deadly 1918 influenza epidemic, or compare causes of death in wealthy versus impoverished neighbourhoods? An internal database created by archivists as part of processing the collection facilitates access to the files. Because of the enormity of the project, only the most basic elements were able to be collected: first and last name and box and file number. Archivists initially collected data on the cause of death, but, due to time constraints, this could not be done consistently. Students were hired after the completion of the project to identify deaths during the Spanish Flu era, from 1918 to 1919, and updates to the database are ongoing as files are pulled for research.

While genealogists remain consistent patrons of the collection, the past few years have seen a rise in an altogether different group of users expressing interest not so much in the content of the files but instead in the aggregate data that could be drawn from the internal database. This interest took the form of requests for content, a metric mentioned by Konkiel et al. (2015) and described in Table 1. One user asked if they could see a list of people who died near rail yards, another inquired about a comprehensive list of workers who were killed in industrial accidents.

Facilitating these requests through the digitization of the entire collection would be problematic for several reasons, not the least of which would be the resources need to scan over 214,000 files. However, the nature of these increasingly common researcher inquiries reveals that such an undertaking would not even be necessary. To answer more complex questions, the A&SC archivists identified the minimalist database as their target, aiming to transform the succinct dataset into something more robust that they could share with external users. The decisions about what to include and how were guided by the requests for content. In one example, staff began to assemble a Google map in an effort to begin providing a visual representation of the deaths.

These efforts aim to answer questions coming from biomedical scientists, journalists, and digital humanists interested in exploring the extent of what this data can illustrate. While efforts to expand what information from the collection is available digitally are still in their early stages, the project demonstrates one way in which users can directly influence digitization and access decisions, even when it is the descriptive information and not the collection itself that is the target.

Thomas Starzl papers

The Dr. Thomas E. Starzl Papers, another University of Pittsburgh collection, incorporated digitized items from the inception of the project. The donor of the archival collection, a world-renowned surgeon who pioneered transplantation surgery, was an incredibly prolific author, accumulating over 2,200 publication credits in his lifetime. Due to the impact of his work on the medical profession, as well as the donor's personal request, the contents of his curriculum vitae were scanned and made available via the library's institutional repository: D-Scholarship@Pitt.

Plum Analytics tracked this digitized material with altmetrics, which revealed two patterns of interaction around Starzl's work, as described by Lauren Collister and Ashley Taylor (2017). First, after Starzl's death in 2017, the altmetrics reflected a very specific kind of use: article *shares* as an expression of mourning. Altmetric data revealed that people influenced by Dr. Starzl's work, including students and colleagues, mourned his death on social media by sharing links to the articles that were most influential to them. While some of the content was generated by a journal tweeting about Stazl's landmark article on liver transplantation, other content included colleagues who shared lesser-known works, with statements about how it influenced their own practice or research. This shows an example of scholarly content pushing the boundaries of scholarly use – scholars using the content as an example of their personal connection to the author.

Altmetrics revealed another pattern of interaction surrounding an article about race and transplantation that Starzl co-authored. This article was frequently cited in online discussions about race when popular publications such as the *Daily Mirror* (e.g., Gregory, 2014) published articles incorrectly reporting that organs cannot be transplanted between people of different races. On social media, Starzl's publication is often mentioned to refute these arguments, sometimes with screenshots of the specific passage stating that race is not a factor in transplantation. Unlike the first pattern, Starzl is not often mentioned by name, making these interactions difficult to track; however, by using altmetrics to track the link back to the publication, these interactions can be captured. This is an example of when the metric mentions can show an interesting new usage of scholarly work and lead to a potential connection with a community that might not have been known without the tracking capabilities from Plum Analytics.

As examined by Collister and Taylor (2017), these unexpected uses raise questions about the applicability of altmetric data to legacy work. The assumption has long been that the pace of scholarship would leave older works with little impact in the world of social media and blogs. Not only did this prove to be false but the data also revealed

unexpected user communities interacting with these works in new ways. The articles were being used less by the medical community and more by a growing community of social media activists. When the intended audience did use them, it was less for their scientific content and more for their demonstration of Starzl's outsized historical impact.

Biodiversity Heritage Library

The Biodiversity Heritage Library (BHL) is an open access digital library for biodiversity literature and archives. Run by a global consortium of natural history and botanical libraries and headquartered at the Smithsonian Institution in Washington, D.C., the BHL aims to make its collections accessible to participate in a "biodiversity commons." The project involves member organizations scanning the public domain books from their collections.

In 2015, the BHL implemented Altmetric badges on the books in its collections. In a blog post, Grace Constantino (2015) from BHL explained how to access the Altmetric badge and the information that it displayed. The post framed altmetrics as a way for the users of BHL's content to connect with other users and share expertise in conjunction with social media sharing functionality on the item records: "Thanks to the social sharing buttons we've added to BHL (see below), it's easier than ever to share your thoughts, expertise, or comments about a BHL book on social media. And thanks to our Altmetric implementation, it's also now easier than ever for others to find those comments in BHL and benefit from your knowledge!" (par. 7).

The user-centred framing of altmetrics in this case suits the content – the authors would likely not benefit from the altmetrics mentioning their work because, as the works are in the public domain, the authors are likely dead. While the descendents and students of the authors might be interested in this new discussion (cf. Starzl content), the key constituency of the BHL is the other users that can interact to form a new user community around the online content. The altmetrics tools provide a vehicle for discovering those communities and work in conjunction with social media sharing buttons to allow users to interact easily. This usage links the metrics of shares and mentions to foster a scholarly conversation, and uses these social media tools in ways akin to a review or comment that appears directly on an item to evaluate the content and its use.

For the staff of the BHL, altmetrics data provides insight into the conversations that are happening around their content. The BHL reports that many people share a link to the content on BHL but do not mention the library's name specifically. Implementation with Altmetric allows them to track those links on social media to discover conversations they could not access previously. These conversations, in turn, help the BHL identify materials in the collection that are very popular and that could be used for social media and blog content to bolster communities and increase engagement (Altmetric, 2017).

Wikipedia seeding

One area of interest for archives and digital collections is the use of material on Wikipedia. Some libraries practice "seeding" content on Wikipedia by having librarians

or library-affiliated Wikipedia editors add selected content from the archives or digital collections to Wikipedia in order to increase discoverability (Galloway & DellaCorte, 2014; Szajewski, 2013). This strategy appears to be successful, as Michael Szajewski (2013) reports that page views at their Hague Sheet Music collection tripled after adding content to Wikipedia. Edward Galloway and Cassandra DellaCorte (2014) also noted an increase in traffic to the Historic Pittsburgh collection from Wikipedia after the initial round of seeding content, as well as an increase in the number of Wikipedia articles that mention or refer to content in the digital archive. In addition to the increased page views from Wikipedia driving new viewers and users to the collection's content, the increase in the number of Wikipedia articles referring to the collection indicates that Wikipedia editors outside of those affiliated with the library or archives are reusing material from the collection in new articles. The community of practice of a particular topic's Wikipedia editors is an important group for the reuse and sharing of material from a collection.

This type of altmetric can be tracked using a number of tools. Google Analytics can describe referring links and traffic patterns to websites and track these over time, showing the page views and referring sites metrics outlined in Table 1. Altmetrics providers such as Plum Analytics, Altmetric.com, and ImpactStory include Wikipedia mentions and citations (see Table 1) as part of the metrics that they collect. With the combination of lists of articles referencing the collection alongside metrics about page views and referring traffic, Wikipedia makes a case for how purposefully knowing which metrics to look at can help evaluate and guide program development, such as digitization projects. In addition, Wikipedia can provide a useful connection to a community that actively uses, reuses, and repurposes material for a high-traffic website that can then drive more potential new viewers and users to a digital collection.

Applications

In each of the examples presented in the previous section, the data surrounding the use of these collections reveals expanded, and often unexpected, user communities employing the archival records for a variety of purposes. Expectations that the coroner files would appeal almost exclusively to nonprofessional genealogist researchers were upended by interest from more traditional "scholarly" parties. To academics, the aggregate data could serve as the foundation of new digital humanities projects, a far cry from the individual researcher interested in the personal details of an ancestor. Social activists and mourning colleagues using Starzl's digitized articles confirmed this surprising expansion of use and community. Altmetric data gathered by the BHL served as a gateway for allowing the institution to enter new conversations and engage with previously unidentified audiences. In each of these cases, digitization – or the potential for it – built upon the use of the physical collections and evolved to allow repositories the chance to reach new online communities. The following section briefly outlines some methods that potential users of altmetrics for archival material can use to incorporate altmetrics information into the curation of a digital collection.

Select and leverage infrastructure with methods to measure altmetric data

In many cases, the digital infrastructure being used to create an online collection has the tools available for tracking metrics. Handles, DOIs, and stable URLs are the basis

for the collection of altmetrics using tools such as Altmetric, Plum Analytics, and ImpactStory. Suggested citations that include these persistent identifiers enable the future collection of metrics. When deciding on a platform or a tool, the potential interfaces between, for example, a repository and altmetrics services can help influence decision-making. With infrastructure already in place, are there existing capabilities that can be leveraged for collecting metrics about the use of the items outside of the platform itself? This approach was used in the Starzl example mentioned above; the ability of the repository to expose metadata to an altmetrics provider led to the creation of an altmetrics profile that revealed unexpected user interactions centred around the publications.

Decide what information is valuable and useful

The many metrics available can be overwhelming to an individual or an organization, especially without a clear path for how to interpret the metrics in a useful way. Table 1 provides some metrics and their potential uses. The curators of a collection must decide which metrics and uses are most helpful for their work. The decision may be based on practicalities. Some metrics, for example, are more easily attainable than others and can lead to more immediate and achievable outcomes (e.g., the coroner case files). The decision may also be based on discovery. A revelation, for example, that some objects in a collection are receiving social media attention (e.g., the Biodiversity Heritage Library).

Identify and pursue diverse communities of practice

Thorough needs assessments and user analyses allow archivists to build new relationships with potential users they might not have previously identified. This leads to the development of dialogue and the curation of archives guided by the community itself. As demonstrated in the examples of the Starzl Papers and the coroner case files, members of the defined "target audience" were not the only, or even the primary, users of the records. Too narrow a definition of potential researchers hobbles outreach efforts and can unconsciously build a wall between the archive and the community, leaving the archive to be branded as irrelevant or unresponsive.

In this work, these new communities are considered communities of users, and, in fact, some of these user groups may be communities of practice. A community of practice, as defined by Jean Lave and Etienne Wenger (1991), is a group of people who are engaged in a common endeavour by mutual agreement (whether tacit or explicit) and who "come to develop and share ways of doing things, ways of talking, beliefs, values – in short, practices" (Eckert, 1996, p. 183). Finding and engaging with an active community of practice can be a valuable resource for archivists, providing user input, new models for usage, and a dynamic environment for their work. Altmetrics can help define a community of users, but engaging with a community of practice will rely on archivists' interactional skills and outreach capacity.

Conclusion

This article has provided a brief sample of the ways that altmetrics can help the creators, curators, and owners of digital collections as they seek to engage with new communities and expand the use of their collections. The examples shown in this

article are necessarily limited by space and knowledge considerations, and it is the hope that other authors will write about their own use cases to inspire the further use of altmetrics in archives and digital collections. With the increase in the use of altmetrics indicators by archives and digital collections, there is an opportunity to develop infrastructure and tools specifically dedicated to these use cases.

Perhaps most importantly, digital tools enable engagement with new communities and users, which is crucial to demonstrating the relevance and impact of archives. Similar to how altmetrics seek to measure engagement with scholarly works in a more complex manner than traditional methods, archivists should not only be cognizant of the ways in which users access their material but what is driving them to do so. By demonstrating responsive, considered approaches to digitization, archival collections become more populist and reflective of the communities that create them. As archivists consider more community-oriented and post-custodial methods of sharing access to material, altmetrics indicators are just one of the tools for finding and connecting with these groups. The information gained from this engagement may help curators make important decisions about acquisitions, community partnerships, digitization and marketing, and the use of their collections.

Websites

Altmetric, http://altmetric.com
Biodiversity Heritage Library, https://www.biodiversitylibrary.org/
Black Lives Matter, https://archive-it.org/collections/4783
Collections as Data, https://collectionsasdata.github.io/
Documenting the Now, https://www.docnow.io
Google Analytics, https://analytics.google.com/analytics/web/provision/?authuser=0#/provision
ImpactStory, http://impactstory.org
Lagotto, http://alm.plos.org
Occupy Wall Street, http://occupyarchive.org
PaperBuzz, http://paperbuzz.org/
Plum Analytics, http://plumanalytics.com/
Wikipedia, https://en.wikipedia.org/wiki/Main_Page
Women's March on Washington, http://ufdc.ufl.edu/WOMENSMARCH

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