

Gerben Zaagsma, Daniel Stökl Ben Ezra, Miriam Rürup,  
Michelle Margolis, and Amalia S. Levi

## Jewish Studies in the Digital Age: Introduction

In the past two decades we have witnessed the rapid increase of events, workshops, sessions, and projects that, in one way or another, are positioned at the intersection of Jewish Studies and Digital Humanities (henceforth: DHJewish). This should hardly come as a surprise given the institutionalization of the digital humanities as a field and the ongoing proliferation of cultural heritage online. These developments have inevitably led to the need to confront the consequences of the so-called digital turn in all fields and disciplines of the humanities and social sciences. The international conference *#DHJewish – Jewish Studies in the Digital Age*, organized by the Centre for Contemporary and Digital History (C<sup>2</sup>DH) of the University of Luxembourg in January 2021, aimed to do so with regard to the field known as Jewish Studies.<sup>1</sup> As in so many comparable events, the conference highlighted the common methodological and epistemological challenges of much work in the digital humanities while, at the same time, seeking to probe the particular. After all, every field and (sub-)discipline has its own characteristics, preferred methodologies, and specific research questions for which certain digital approaches might be particularly suitable. This volume gathers a selection of revised and extended papers from the conference that, taken together, reflect the current state of what we call *DHJewish*.

The question of how technology affects or might affect Jewish Studies in the present and future is not new.<sup>2</sup> In fact, attempts to chart how new technologies could alter research practices in Jewish Studies date back to at least 1969 when Henry Ekstein, during the Fifth World Congress of Jewish Studies in Jerusalem, presented a paper outlining a vision for a database that, in his view, would solve

---

1 For more information and a link to the online conference archive with all session recordings, see: <https://www.c2dh.uni.lu/events/dhjewish-jewish-studies-digital-age> (all URLs in this introduction were last accessed on January 18, 2022, unless noted otherwise). All authors of this introduction were part of the conference program committee.

2 This introduction is partly based upon: Gerben Zaagsma, “#DHJewish – Jewish Studies in the Digital Age,” *Medaon* 12 (2018): 1–11; Gerben Zaagsma, Keynote lecture, “Exploring Jewish History in the Digital Age,” *International Conference What’s New, What’s Next? Innovative Methods, New Sources, and Paradigm Shifts in Jewish Studies*, POLIN Museum of the History of Polish Jews, Warsaw, October 3–6, 2021. See: <https://doi.org/10.5281/zenodo.6631756>.

many of the information storage and retrieval challenges facing the field of Jewish Studies.<sup>3</sup> Ekstein argued that, given the state of technology, it was possible to “establish a large scale data bank which would include information in the field of Jewish Studies, and to connect this bank by means of a telecommunication network to the most important research centers in this field all over the world.”<sup>4</sup> Ekstein’s vision is reminiscent of early information organization systems, as developed and realized by the Belgian lawyer and proto information scientist Paul Otlet and his companion Henri Lafontaine.<sup>5</sup> It also echoes developments in data communications networks that got underway in the 1960s and would eventually evolve into the Internet in the 1980s and World Wide Web in the 1990s. Ekstein, in sum, was effectively outlining what an online library for Jewish Studies could look like in an age when digital computing began to replace its analog siblings.

Ekstein’s remarks raise a number of broader questions, however. To begin with, they hint at the *longue durée* of the encounter between technology and the humanities, in techno-material terms as well as in thinking through its broader consequences for humanities research practices. Secondly, they highlight challenges in the realm of information management that were by no means exclusive to the field of Jewish Studies alone and had been discussed by early information scientists for some decades already. And finally, Ekstein’s remarks notwithstanding, the mechanical tools that he spoke of had in fact undergone significant change since the late 19th century and Jewish Studies scholars had keenly taken advantage of the possibilities they afforded ever since then. Indeed, while Ekstein might have been one of the first to reflect upon the overall state of Jewish Studies at the dawn of humanities computing, he clearly drew upon important developments preceding him. In fact, historians such as Samuel Oppenheim had been using the photostat since the 1920s to gather dispersed materials about their research topics. In the late 1930s and early 1940s geographers and demographers began to use punched card technology in the realm of Jewish Population Studies, following its entry in academic research in general, not only in the sciences, but also anthropology, literature, the social sciences, and (economic) history.<sup>6</sup> Not

---

3 Henry C. Ekstein, “How to Increase Effectiveness of Research in Jewish Studies,” *Proceedings of the World Congress of Jewish Studies* (1969): 3–7.

4 Ekstein, “How to Increase Effectiveness of Research in Jewish Studies,” 5.

5 W. Boyd Rayward, ed., *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet* (Amsterdam: Elsevier, 1990).

6 Sophia Robison and Joshua Starr, *Jewish Population Studies: Conference on Jewish Relations, New York, 1943* (New York: Conference on Jewish Relations, 1943). For a general overview of the emerging application of punched card technology in academia in the 1930s, see: G.W. Baehne, *Practical Applications of the Punched Card Method in Colleges and Universities* (New York: Columbia University Press, 1935).

much later, in the late 1940s, microfilming Jewish archives got underway, while work also began on automated machine translation, concordances, and word indexes.<sup>7</sup>

The latter's impact in Jewish Studies would soon be felt. On March 26, 1958, the Jesuit priest and scholar Roberto Busa and engineer Paul Tasman held a press conference at IBM's headquarters in New York to describe their literary data processing work on the Dead Sea Scrolls using punched card technology. Their presentation made headlines all over the world and Busa subsequently also presented the research in July 1961 at the third World Congress of Jewish Studies in Jerusalem.<sup>8</sup> This work was an offshoot of Busa's work on the Index Thomisticus, begun in 1949 with the help of IBM, which would eventually earn him the reputation of "founding father" of the Digital Humanities, though this foundational myth has meanwhile been thoroughly questioned and scholars have recently also emphasized the "female operatives" of his work and interrogated the "cultural, intellectual, and social conditions that shaped the earliest work in digital humanities."<sup>9</sup>

In 1959, inspired by Busa, the recently founded Israel Academy of the Hebrew language decided to create a database for its *Historical Dictionary*, today's *ma'agarim*, one of the first of its kind for a major historical language.<sup>10</sup> Around the same time, great strides were also made in the realm of Yiddish Studies and

---

7 Dolores M. Burton, "Automated Concordances and Word Indexes: The Fifties," *Computers and the Humanities* 15, no. 1 (1981), <https://doi.org/10.1007/BF02404370>.

8 Paul Tasman, *Indexing the Dead Sea Scrolls by Electronic Literary Data Processing Methods* (New York: IBM, 1958). Roberto Busa, "The Index of All Non Biblical Dead Sea Scrolls Published up to December 1957," *Revue de Qumrân* 2 (October 1958): 187–98. For the global resonance see, for example, this set of articles on the Dutch Delpher website: accessed May 2, 2018, <http://bit.ly/2mu7htf>. Busa himself reminisced about the occasion in: Roberto Busa, "The Annals of Humanities Computing: The Index Thomisticus," *Computers and the Humanities* 14, no. 2 (1980): 83–90, 85, <https://doi.org/10.1007/bf02403798>. For an elaborate analysis of this work see also: Steven E. Jones, *Roberto Busa, S.J., and the Emergence of Humanities Computing: The Priest and the Punched Cards* (Routledge: London, 2016), ch. 5.

9 Steven Jones has complicated and contextualized this founding myth in his important work on Busa, see: Jones, *Roberto Busa*. See also, Melissa Terras and Julianne Nyhan, "Father Busa's Female Card Operatives," in *Debates in the Digital Humanities 2016*, <https://dhdebates.gc.cuny.edu/read/untitled/section/1e57217b-f262-4f25-806b-4fcf1548beb5>; Geoffrey Rockwell and Stefan Sinclair, "Tremendous Mechanical Labor: Father Busa's Algorithm," *DHQ* 14, no. 3 (2020), <http://www.digitalhumanities.org/dhq/vol/14/3/000456/000456.html>.

10 See: <https://maagarim.hebrew-academy.org.il/>. On the history of the project see: Zeev Ben-Haim, "On the Making of the Historical Dictionary of the Hebrew Language of the Academy of the Hebrew Language," *Leshonenu* 23 (1959): 102–23 [Hebrew]; R. Merkin, Z. Busharia, and E. Meir, "The Historical Dictionary of the Hebrew Language," *Literary and Linguistic Computing* 4, no. 4 (January 1, 1989): 271–73, <https://doi.org/10.1093/lc/4.4.271>; Israel Yeivin, "Le dictionnaire historique de la langue hébraïque," *Meta* 43, no. 1 (1998): 19–26.

Yiddish linguistics to expand the use of punched cards to enable the processing of linguistic data. In 1961 the linguist Uriel Weinreich managed to acquire funding to use “machine aids” for the creation of the Language and Culture Atlas of Ashkenazic Jewry (LCAAJ). A proposal from around 1960 in the LCAAJ archives shows a request for 200,000 cards and 500 hours of machine use at the newly created IBM Watson Scientific Laboratory at Columbia University.<sup>11</sup> As Weinreich noted: “When one tries to visualize the editing of an atlas of many hundreds of maps, with up to 500 locations on each, it becomes clear what advantages are gained by the electronic filing and sorting of the data.”<sup>12</sup> A few years later, in 1967, the Responsa Project launched, a computerized full-text retrieval system providing access to, as Yaacov Choueka described it, “Rabbinical case-law documents spanning more than ten centuries.”<sup>13</sup>

## 1 From Humanities Computing to Digital Humanities

As will be clear from this very sketchy overview, when Ekstein told his audience at the World Congress of Jewish Studies in 1969 that “the mechanical tools with which the researcher works have remained almost unchanged in the last five hundred years,” he missed some very important developments. At that point in time, the late 1960s, humanities computing had firmly taken hold in the academy with its own conferences and events being organized as well as its own publications. It would continue to develop as the era of mainframe computing began to give way to micro- and personal computers which were introduced at universities from the late 1970s onwards. From 1973 onwards, a long series of 90 colloquia on humanities computing at the University of Tübingen demonstrates well the growing use of computers, especially the TUEbinger System von TExtverarbeitungs-Programmen (TUSTEP),<sup>14</sup> with a considerable impact on Jewish Studies in (printed) editions or

---

**11** “Description of Project,” Box 236, Folder 13, Archives of the Language and Culture Atlas of Ashkenazic Jewry, Rare Book and Manuscript Library, Columbia University.

**12** Uriel Weinreich, “Machine Aids in the Compilation of Linguistic Atlases,” *American Philological Society Yearbook* 1963 (1964): 622–25.

**13** Yaacov Choueka, “Computerized Full-Text Retrieval Systems and Research in the Humanities: The Responsa Project,” *Computers and the Humanities* 14, no. 3 (November 1, 1980): 153–69, <https://doi.org/10.1007/BF02403764>.

**14** This powerful computer program for philological work, editions, synopses, concordances, and sophisticated page-layout is still used in many large projects more than 40 years after its first version.

synopses of the Mishnah, the Palestinian Talmud, and Hekhalot Literature and a concordance of the latter.<sup>15</sup> For the study of the biblical text, morphologically tagged versions of Hebrew, Greek, Syriac, Latin, and other texts were developed and aligned from the early 1980s and led to breakthroughs in the study of translation and a series of five conferences on computing and the Bible.<sup>16</sup> When the Internet and World Wide Web arrived on the scene in the early 1990s, as before, Jewish Studies scholars were quick to take advantage. Beginning in 1988, for instance, Martin Abegg famously used a personal computer to reconstruct the text of the unpublished Dead Sea Scrolls from the unpublished Preliminary Concordance, using a Macintosh SE that some nicknamed “Rabbi Computer.”<sup>17</sup> His work led to their groundbreaking but controversial publication in 1991 and was quickly integrated into the first commercial program packages for Biblical Studies.<sup>18</sup>

During all this time, librarians and archivists eagerly discussed and explored the possible applications of new technologies too, including for instance on the pages of the American journal *Judaica Librarianship*.<sup>19</sup> They also actively sought to shape the future form of the Jewish documentary record. In October 1991, at a

---

**15** Michael Krupp, “Das Mischna-Editionsprojekt” (February 2, 1974), Michael Krupp, “Computer-unterstützte Zusammenstellung von textkritischen Apparaten. Erfahrungen bei der Vorbereitung der Mischna-Edition” (July 2, 1977), Gottfried Reeg, “Spaltensynopse und Zeilensynopse als Darstellungsformen für kritische Texteditionen” and “Konkordanz zur Hekhalot-Literatur” (both June 30, 1984). Summaries accessible at <http://www.tustep.uni-tuebingen.de/kolloq.html>. The projects led to Michael Krupp et al., *Mischna*, 7 vols. (Jerusalem: Lee Achim, 2018); Peter Schäfer with Margarete Schlüter and Hans-Georg von Mutius, *Synopse zur Hekhalot-Literatur*. Texts and Studies in Ancient Judaism 2. (Tübingen: Mohr-Siebeck, 1981); Peter Schäfer with Gottfried Reeg et al., *Konkordanz zur Hekhalot-Literatur*, 2 vols. TSAJ 12–13 (Tübingen: Mohr-Siebeck, 1986 and 1988); Peter Schäfer, Hans-Jürgen Becker with Gottfried Reeg et al., *Synopse zum Talmud Yerushalmi*, 7 vols.) (TSAJ 31, 33, 35, 82, 83, 67, 47) (Tübingen: Mohr-Siebeck, 1991–2001).

**16** Robert Kraft and Emmanuel Tov, “Computer-Assisted Tools for Septuagint Studies,” *Bulletin of the International Organization of Septuagint and Cognate Studies* 14 (1981): 22–40. Robert A. Kraft, Emanuel Tov, and John R. Abercrombie, *Computer Assisted Tools for Septuagint Studies* (Atlanta, GA: Scholars Press, 1986). The first conference was published as *Proceedings of the First International Colloquium Bible and Computer, The Text, Louvain-la-Neuve (Belgique) 2–3–4 September 1985* (Paris: Champion; Geneva: Sladkine, 1986).

**17** Jones, *Roberto Busa*, 144–47, 145.

**18** In particular, Accordance Software, which started in 1988 and developed many supplementary modules and complex search syntactical feature queries has a great impact in the study of ancient Judaism. See also: Johanna Sprondel, “Toward a Humanities of the Digital? Reading Search Engines as a Concordance,” in *The Making of the Humanities*, vol. 3, *The Modern Humanities*, ed. Rens Bod, Jaap Maat, and Thijs Weststeijn (Amsterdam: Amsterdam University Press, 2014), 479–93, 483.

**19** *Judaica Librarianship*, last accessed May 2, 2018, <https://ajlpublishing.org/>. See, e.g., Diane Romm, “Retrieval of Judaica from Electronic Media: An Overview,” *Judaica Librarianship* 8, no.

time when the PC had become a common tool for scholars and the Internet had arrived at universities, the Leo Baeck Institute organized a conference on “Problems and Issues in Jewish Archives and Historiography in the Five New States of Germany.” The meeting resulted in a plan to create a database of Jewish archival holdings in the states of the former German Democratic Republic (GDR) with the aim of enhancing access to these dispersed collections. In an echo of Ekstein’s earlier vision, Robert Jacobs noted: “How very fortunate we are to live in a time when electronic capabilities enable us to provide bibliographic references that will allow subsequent generations of scholars to find the materials they seek with no more than a few keystrokes.”<sup>20</sup> The plan was an excellent example of the kind of “database” that Ekstein had in mind. Importantly, the idea was for an online catalog, not a digitization project.

Soon, however, the publication of primary sources in the form of CD-ROMs and online databases and textual editions began, and it would lead to a veritable sea change during the 1990s, enabling far easier access to source materials and fundamentally changing scholarly information management practices. The impact of these developments on the field of Jewish Studies was a major focus of Heidi Lerner’s *Perspectives on Technology* column in the Association of Jewish Studies’ (AJS) *Perspectives* magazine, published on a regular basis between 2003 and 2011.<sup>21</sup> Lerner’s 2002 article “New Technologies and Old Methodologies: Jewish Studies Research in the Digital Age” was probably one of the first to comprehensively address the possibilities that the digital turn offered for Jewish Studies scholars.<sup>22</sup> And then as now, as Lerner’s column highlights, librarians and archivists were at the forefront of digital developments and pointed the way for humanities scholars.

The early 2000s was also the period of the transition from humanities computing to what we now call “digital humanities,” characterized by mass digitization, “big data,” and the proliferation of new tools and new forms of knowledge dissemination. Digital humanities work in Jewish Studies in the past two decades has been made possible by a plethora of projects that bring together hitherto dispersed, inaccessible, or fragile materials into digital archives and collections that

---

1–2 (1993): 61–63 and Bella Hass Weinberg, “*Judaica Librarianship* in the Age of the Internet,” *Judaica Librarianship* 9, no. 1–2 (1995): 3–5.

<sup>20</sup> Robert Jacobs, “Jewish Archival Holdings in the Five New States of Germany: Creating an Inventory,” *Judaica Librarianship* 8, no. 1 (1994): 17–22, 22, <https://doi.org/10.14263/2330-2976.1222>.

<sup>21</sup> AJS, *Perspectives on Technology*, last accessed May 2, 2018, <https://www.associationforjewishstudies.org/what-is-jewish-studies/digital-jewish-studies/perspectives-on-technology>.

<sup>22</sup> Heidi Lerner, “New Technologies and Old Methodologies: Jewish Studies Research in the Digital Age,” *Shofar: An Interdisciplinary Journal of Jewish Studies* 20, no. 4 (2002): 81–95, <https://doi.org/10.1353/sho.2002.0073>.

facilitate digital scholarship. If dispersion is the common denominator among many primary source collections for Jewish Studies, then the digital offers the possibility to virtually bring together dispersed materials.

The issue of dispersion also relates to one of the key characteristics of the Jewish historical experience, migration and its transnational aspects. It is hardly surprising then that Jewish migration, especially East European, ranks prominently among digital resources. Among several well-known YIVO projects, such as the Encyclopedia of Jews in Eastern Europe, the exceptional Vilna Collections Project should be mentioned, which will offer unprecedented access to the largest archive on East European Jewish History in the world.<sup>23</sup> These projects exist side by side with a huge variety of national and local history projects, which often also exhibit transnational dimensions, such as Memoria Viva and the Jewish Diaspora Collection (part of the University of Florida's Digital Collections) which focus on Latin America, including the Caribbean.<sup>24</sup> National, regional, and local history projects comprise too many to mention. Some examples with clear transnational dimensions include the South African Jewish Museum's digital archive and the South Africa Jewish Rootsbank, Yiddish Melbourne, and DigiBaeck (the Digital Collections of the Leo Baeck Institute).<sup>25</sup> More nationally focused projects include Key Documents of German-Jewish History and the Digital Library of the Italian Foundation Center for Contemporary Jewish Documentation.<sup>26</sup> Other digitized collections, such as the Sephardic Studies Digital Collection at the University of Washington aim to shed light on lesser known histories and languages of Sephardic Jews and counter the loss of history and culture of dispersed and gradually dwindling communities.<sup>27</sup>

Next to migration, the Holocaust is probably the single most important topic, covered by a wide range of resources that include the European Holocaust Research Infrastructure (EHRI), Arolsen Archives, the USC Shoah Foundation Institute's Visual History Archive Online (VHA Online), the German Memorial Book project, the Czech Holocaust Victims and Document Database, and the New York Public Library's Yizkor Book Collection.<sup>28</sup> As so many Holocaust-related sources and tes-

---

<sup>23</sup> See: <https://vilnacollections.yivo.org/>.

<sup>24</sup> See: <https://yivoencyclopedia.org/default.aspx>; <https://www.yivo.org/vilna-collections-project>; <https://mviva.org/>; <https://ufdc.ufl.edu/judaica>.

<sup>25</sup> See: <https://sajmarchives.com/>; <http://www.jewishroots.uct.ac.za/>; <https://www.monash.edu/arts/acjc/yiddish-melbourne>; <https://www.lbi.org/collections/digibaeck/>.

<sup>26</sup> See: <https://jewish-history-online.net/>; <http://digital-library.cdec.it/cdec-web/>.

<sup>27</sup> <https://content.lib.washington.edu/sephardicweb/index.html>.

<sup>28</sup> See: <https://ehri-project.eu/>; <https://arolsen-archives.org/>; <https://vhaonline.usc.edu/>; <https://www.bundesarchiv.de/gedenkbuch/>; <https://www.holocaust.cz/databaze-obet/>; <https://digital-collections.nypl.org/collections/yizkor-book-collection#/>.

timonies have become available online, scholarly attention has shifted in recent years towards studying the nature of Holocaust memory in the digital age.<sup>29</sup>

In terms of types of sources being digitized, textual sources such as newspapers, manuscripts, and books, dominate. The National Library of Israel's Historical Jewish Press website contains, at the time of writing, 625 newspapers in 20 languages from all over the world, though with clear foci on the regions of East Europe, the Middle East, and North America, Jewish languages in Yiddish and Hebrew, and non-Jewish languages, such as Arabic, Polish, French, and English.<sup>30</sup> The website provides a robust OCR and search function in four alphabets to allow greater use of and access to the materials, which enables the kind of comparative research that would require extensive research trips only a decade ago. Other newspaper databases complement these holdings, a notable resource to mention is Compact Memory which contains 424 periodicals in nine languages, the bulk being in German.<sup>31</sup> Compact Memory is part of the digitized Judaica collections of Frankfurt University Library which offers thousands of digitized books.<sup>32</sup> In this respect one should also mention important resources such as the Yiddish Book Center's Digital Yiddish Library, and the seminal International Collection of Digitized Hebrew Manuscripts project (KTIV).<sup>33</sup>

The example of KTIV also highlights an important point. While many libraries are digitizing their collections, work in digital humanities goes well beyond posting digital facsimiles online. It is important to distinguish between scholarly work that simply uses "digital" tools (which, it could be argued, applies to nearly everything, since something as basic as word processing uses the digital to express words on paper) and research that uses computational tools and digital methods to analyze and interpret digitized materials.

This distinction is abundantly clear in the case of Hebrew manuscript studies. Over the past three decades, Hebrew manuscripts became the object of several studies in the field of computerized document analysis questions such as script classification, writer identification, layout segmentation, handwritten text recogni-

---

**29** See especially: Jeffrey Shandler, *Holocaust Memory in the Digital Age: Survivors' Stories and New Media Practices* (Stanford, CA: Stanford University Press, 2017) and his chapter Digitizing Holocaust Memories in this volume. For Holocaust research in the digital age see the various articles in special issue no. 13 of *Quest. Issues in Contemporary Jewish History* in 2018. For the introduction: Laura Brazzo and Reto Speck, "Holocaust Research and Archives in the Digital Age: Introduction," *Quest. Issues in Contemporary Jewish History* 13 (2018): V–XIII.

**30** See: <https://www.nli.org.il/en/discover/newspapers/jpress>.

**31** See: <https://sammlungen.ub.uni-frankfurt.de/cm/nav/index/title>.

**32** See: <https://sammlungen.ub.uni-frankfurt.de/judaica/nav/index/all>.

**33** See: <https://www.yiddishbookcenter.org/collections/digital-yiddish-library>; <https://web.nli.org.il/sites/nlis/en/manuscript>.



tion, text to image alignment, and crowdsourcing.<sup>34</sup> Larger, accessible text corpora, stronger and more high-performance computers, and the (re)discovery of neural networks also caused a huge increase in the application of Natural Language Processing (NLP) on Semitic and Jewish Languages. Only in the last five years has performance reached production level for morphological, lexical and syntactical tagging, named entity recognition, stylometrics, author attribution, text reuse, topic modeling, and sentiment analysis even for historical texts.<sup>35</sup> Similarly, in the field of computer vision applied to manuscript studies, after the pioneering studies of the early years of the new millennium as, for example, exemplified in the join-discovery tool of the Friedberg Genizah project (FGP),<sup>36</sup> the last five years have led to breakthroughs that allow mass applications of previously unthinkable scale.<sup>37</sup> The FGP, created in 2005 by and around Yaacov Choueka, assembles images, transcriptions, and metadata on more than 250,000 fragments with more than 600,000 images dispersed in more than 70 repositories worldwide.<sup>38</sup> It was also one of the first projects worldwide in any discipline to apply cutting edge computer vision, natural language processing, and data-mining on a very large scale to historical documents.<sup>39</sup>

Alongside the study of Hebrew manuscripts, digital humanities methods have been applied to the study of the Jewish book and Jewish languages. One such approach is offered by Marienberg-Milikowsky focusing on the study of reli-

---

**34** One of the first computer vision projects applied to Hebrew manuscripts was Laurence Likforman-Sulem, Henri Maitre, and Colette Sirat, “An Expert Vision System for Analysis of Hebrew Characters and Authentication of Manuscripts,” *Pattern Recognition* 24, no. 2 (1991): 121–37. See also Itay Bar Yosef, Klara Kedem, Its’hak Dinstein, Malachi Beit-Arie, and Edna Engel, “Classification of Hebrew Calligraphic Handwriting Styles: Preliminary Results,” *DIAL* (2004): 299–305.

**35** E.g. Avi Shmidman, Shaltiel Shmidman, Moshe Koppel, and Yoav Goldberg, “Nakdan: Professional Hebrew Diacritizer,” *ACL (demo)* (2020): 197–203. Compare Shuly Wintner, “Hebrew Computational Linguistics: Past and Future,” *Artificial Intelligence Review* 21, no. 2 (2004): 113–38 with Amit Seker, Elron Bandel, Dan Bareket, Idan Brusilovsky, Refael Shaked Greenfeld, and Reut Tsarfaty, “AlephBERT: A Hebrew Large Pre-trained Language Model to Start-Off Your Hebrew NLP Application With,” *CoRR abs/2104.04052* (2021), <https://arxiv.org/abs/2104.04052>. See the contributions by Shmidman and Waxman in this volume.

**36** See Roni Shweka, Yaacov Choueka, Lior Wolf, and Nachum Dershowitz, “Veqarev otam ehad el ehad: Zihuy ktav yad vetseruf qit’ei hagnizah beemtsa’ut mahshev,” *Ginzei Qedem* 7 (2011): 173–209.

**37** See, e.g., Daniel Stökl Ben Ezra, Bronson Brown-DeVost, Pawel Jablonski, Hayim Lapin, Benjamin Kiessling, and Elena Lolli, “BibLIA: A General Model for Medieval Hebrew Manuscripts and an Open Annotated Dataset,” *HIP@ICDAR 2021*: 61–66.

**38** Yaacov Choueka, “Computerizing the Cairo Genizah: Aims, Methodologies and Achievements,” *Ginzei Qedem* 8 (2012): 9–30.

**39** Shweka et al., “Veqarev otam ehad el ehad.”

gious Hebrew and Aramaic manuscripts and languages.<sup>40</sup> The increase in such initiatives in recent years is evidenced by projects such as *Tikkoun Sofrim*, which uses AI to transcribe Hebrew manuscripts, *Footprints*, which traces the movement of Jewish books through time and place, *HaMapah*, which traces rabbinic networks based on printed responsa, and *Geniza Scribes*, which invites “the crowd” to transcribe manuscripts in Hebrew, Arabic, and other languages, from the Cairo Geniza.<sup>41</sup>

Digital humanities methods are also used to facilitate historical research beyond dispersed primary sources and against national borders. Some examples are projects such as *Mapping Modern Jewish Cultures*,<sup>42</sup> which explores space, time, and multilingual Jewish communities through the lens of cafés in urban environments; the Wikidata-based *EHRI Ghettos*<sup>43</sup> authority list of Holocaust-era ghettos; *Mapping Jewish LA*,<sup>44</sup> which uses digital tools to highlight the diversity of Jewish experiences in one single place; and the *Documenting Judeo-Spanish*<sup>45</sup> project, which aims to document and provide access to Sephardic texts written with the Solitreo script.

Surveying all of these projects, a broader picture emerges. As Gerben Zaagsma argued a few years ago, Jewish history presents specific challenges in the realm of information management due to its textual tradition, its diasporic nature, the – forced – migration of people, texts, ideas, and thus its transnational aspects. These characteristics, which can equally be applied to the field of Jewish Studies in general, are, in turn, reflected in both the state of Jewish heritage (dispersal of sources and objects) and its nature (multilingual, multiscriptual, and often textual). As a result, a key technological challenge for Jewish history in the digital age, and Jewish Studies more generally, is to work towards solutions for information retrieval and analysis from dispersed, multilingual, and multiscriptual sources.<sup>46</sup> Much work in this direction has been done in the past three decades and it has allowed us to engage the transnational, interactional, inter-, intra- and cross-cultural dimensions of Jewish history in new ways.

---

<sup>40</sup> Itay Marienberg-Milikowsky, “Digital Research of Jewish Texts: Challenges and Opportunities,” in *Textual Transmission in Contemporary Jewish Cultures*, ed. Avriel Bar-Levav and Uzi Rebhun (New York: Oxford University Press, 2020), 15–25, <https://doi.org/10.1093/oso/9780197516485.001.0001>.

<sup>41</sup> For digital editions of rabbinical texts see e.g. Chaim Milikowsky, “Scholarly Editions of Three Rabbinic Texts – One Critical and Two Digital,” in *Advances in Digital Scholarly Editing*, ed. Peter Boot et al. (Leiden: Sidestone Press, 2017), 137–46.

<sup>42</sup> <https://richbrew.org/>.

<sup>43</sup> [https://portal.ehri-project.eu/vocabularies/ehri\\_ghettos](https://portal.ehri-project.eu/vocabularies/ehri_ghettos).

<sup>44</sup> <http://www.mappingjewishla.org/>.

<sup>45</sup> <https://documentingjudeospanish.com/>.

<sup>46</sup> Zaagsma, “Jewish Studies in the Digital Age.”

Fifteen years ago Paula Hyman argued for the importance of comparative approaches to integrate what she called minority history into the history of majority populations.<sup>47</sup> Around the same time Moshe Rosman sought to probe the challenges that postmodernism posed for engaging with Jewish history, or Jewish histories, including questions of Jewish identity, periodization, and intercultural relations.<sup>48</sup> More recently, Zwiep and Wallet have suggested that “big data” might be one answer to some of these questions as its longitudinal character can help us explore the *longue durée* of Jewish history.<sup>49</sup> If indeed some of the key tenets of Jewish historiography nowadays lie in studying inter- and intra-Jewish as well as Jewish/non-Jewish interactions, and in probing their fluid, constantly changing, and evolving nature in space as well as in and over time, then digitization and digital history are well placed to address the challenges involved.

Online resources make comparisons within and between Jewish populations as well as between Jewish and non-Jewish populations easier than ever; they can help answer the crucial question of what was specific for *which* Jewish experiences, and for *whose* Jewish experiences. Computational techniques allow us to trace long-term trends in, for instance, newspapers and thus shifting discourses and concerns; network analysis can help chart the global migration of books and intellectual ideas and explore Jewish interconnectedness across borders; migration and migrant experiences can be traced, explored, and compared through newspapers and other sources. Both the multiplicity and diversity of Jewish histories and experiences and the commonalities that unite and unify them are thus open for new and renewed explorations.<sup>50</sup>

As exciting as many of these digital projects are, though, a note of caution is in order. The continuity of digital humanities work is intimately bound up with sustainable digital preservation, and obsolescence is a serious concern. Just as the original data from the LCAAJ project could not be accessed digitally without re-digitizing the texts and OCRing them to allow searchability, many digital projects are no longer accessible because of obsolete hardware or software. An innovative virtual exhibition allowing a walkthrough of the Braginsky collection, virtually turning pages of manuscripts in exhibition cases, is no longer accessible because the Flash product that it used is no longer supported. Link rot abounds,

---

47 Paula Hyman, “Recent Trends in European Jewish Historiography,” *Journal of Modern History* 77 (2005): 345–56.

48 Moshe Rosman, *How Jewish Is Jewish History?* (Oxford: Littman Library of Jewish Civilization, 2007).

49 Bart Wallet and Irene Zwiep, “Session 0.8.I/II: Humanities in the Mirror: Writing Jewish History in a Digital Key,” EAJS Quadrennial Congress, Kraków, July 15–19, 2018.

50 See also: Zaagsma, “Exploring Jewish History in the Digital Age.”

and many “cutting edge projects” of a decade ago are no longer accessible. There is still much work to be done on this front.

## 2 Taking Stock

To take stock of the myriad developments that were outlined above, a range of events have been organized over the past decade. The Center for Jewish History (CJH) ran a workshop in 2011 entitled *From Access to Integration: Digital Technologies and the Study of Jewish History*, which sought to “explore in a systematic way new approaches to coordinating and integrating the digitization of Jewish historical sources around the world.”<sup>51</sup> The workshop also aimed to connect Jewish Studies information specialists as a means of addressing the “challenges faced by many institutions in employing emerging technologies for the study of Jewish history.” Perhaps ironically, and as a strong case in point that illustrates the abovementioned point about obsolescence, the conference website and other associated materials are no longer online, and the only live content remaining are the tweets using the hashtag #cjh-a2i.<sup>52</sup>

In his keynote lecture during the workshop, entitled “Digitization and Its Discontents for Jewish History,” historian Anthony Grafton outlined the various ways in which the digital turn is affecting academia and academic libraries, including the possibilities of digitally reuniting dispersed material. He also noted that much of Jewish scholarship happens outside academic circles, meaning that open access to online Jewish resources had become highly important.<sup>53</sup> Unfortunately, the various blog posts devoted to the conference do not reveal what, if any, answers were formulated as to the new approaches and challenges mentioned above, or indeed provide much detail as to what these were in the first place.<sup>54</sup> A promised “white paper” following the conference unfortunately did not materialize. On Twitter, though, we find some traces of the debate as it took place. Librar-

---

<sup>51</sup> From Arthur Kiron’s introduction to: Anthony Grafton, “Digitization and Its Discontents for Jewish History,” a talk delivered at the International Conference *From Access to Integration: Digital Technologies and the Study of Jewish History* Center for Jewish History, New York, 2012, 2, last accessed June 12, 2014, <http://www.cjh.org/CJHGraftonDigitization/> (no longer available online).

<sup>52</sup> Workshop, *From Access to Integration: Digital Technologies and the Study of Jewish History*. An archived version of the conference website’s About page can be accessed here: accessed November 30, 2021, <https://web.archive.org/web/20120126155457/http://techconference.cjh.org/about.php>.

<sup>53</sup> Grafton, “Digitization and Its Discontents,” 17–19.

<sup>54</sup> Last accessed March 20, 2018, <https://16thstreet.tumblr.com/search/access+to+integration>.

ian Deanna Marcum, for example, noted the international scope, long history, and multilingualism as distinct features of Jewish Studies, while also stressing that all fields share certain fundamental needs for infrastructure, governance, funding, selection, etc.<sup>55</sup>

The CJH workshop was the start of a decade full of DHJewish events. In 2012 Brown University organized a workshop “Ancient Religions, Modern Technology” devoted to the ways in which the digital humanities has or can change the study of religion in antiquity.<sup>56</sup> In 2013, the Institute for the History of the German Jews (Institut für die Geschichte der deutschen Juden) in Hamburg organized the workshop *Jüdische Geschichte Digital* (Digital Jewish History).<sup>57</sup> Taking stock of a wide variety of digital projects pertaining to German-Jewish history, the event led to the creation of the network *Jüdische Geschichte Digital* within the digital history working group of the Historikerverband, the German Historical Association.<sup>58</sup>

Meanwhile, the annual AJS conference and the European Association of Jewish Studies (EAJS) conference, held every four years, began to include panels and workshops on Jewish Studies and Digital Humanities. Both the 2012 and 2013 AJS conferences featured a THATCamp Jewish Studies and in 2014 a THATCamp was organized in Haifa, Israel.<sup>59</sup> The Association of Jewish Libraries (AJL) held a digital humanities Roundtable at its 2014 meeting, and the keynote that year, by Emile Schrijver, was titled “Between Being-Wise and Not-Knowing-What-To-Ask: Jewish Librarianship and Digital Humanities.” AJL’s journal, *Judaica Librarianship*, began publishing a regular review column of DHJewish projects in 2017.<sup>60</sup> In 2015, a conference entitled *On the Same Page: Digital Approaches to Hebrew*

---

55 Last accessed March 20, 2018, <https://twitter.com/search?l=&q=%23cjh-a2i&src=typd&lang=eng>.

56 See the call for papers: <http://aramaicnt.org/2011/04/06/call-for-papers-ancient-religion-modern-technology-workshop/>.

57 *Jüdische Geschichte Digital* workshop, last accessed March 20, 2018, <https://www.hsozkult.de/event/id/termine-22109>, organized by Anna Menny and Miriam Ruerup. For a conference report see: Gerben Zaagsma, Tagungsbericht *Jüdische Geschichte Digital*. 13.06.2013–14.06.2013, Hamburg, in *H-Soz-u-Kult*, September 10, 2013, available online at: last accessed May 2, 2018, [www.hsozkult.de/conferencereport/id/tagungsberichte-5011](http://www.hsozkult.de/conferencereport/id/tagungsberichte-5011).

58 Netzwerk *Jüdische Geschichte Digital*, last accessed April 5, 2018, <http://www.historikerverband.de/arbeitsgruppen/ag-digitale-gw/netzwerk-juedisches-geschichte-digital.html>.

59 With regard to the 2012 AJS THATCamp see: Jeffrey Shandler, “From the President,” *AJS Perspectives*, Fall (2012): 3–4. For the individual camps: <http://jewishstudies2012.thatcamp.org/>; <http://jewishstudies2013.thatcamp.org/>; <http://haifa2014.thatcamp.org/>.

60 See the introduction to the new column: Michelle Margolis, “JS/DH: An Introduction to Jewish Studies/ Digital Humanities Resources,” *Judaica Librarianship* 20, no. 1 (2017), <https://doi.org/10.14263/2330-2976.1293>.

*Manuscripts* took place at King's College London.<sup>61</sup> A follow-up EAJS round table, *Turning the Page: Jewish Print Cultures & Digital Humanities*, at the University of Amsterdam in February 2017, dealt with “early modern print cultures and the specific questions associated with them, e.g. regarding Jewish multilingualism, geographical space, the linking of various disparate library and archive collections, and methods, scales and techniques of textual analysis.”<sup>62</sup> *From “Tablet” to “Tablet”: A Digital Humanities Workshop* was held at the Institute for the History of the German Jews in Hamburg in September 2017.<sup>63</sup>

Around the time the EAJS established a *Digital Forum* to engage with digital scholarship more comprehensively,<sup>64</sup> the 2018 EAJS conference in Kraków also featured two “digital” sessions; one on *Humanities in the Mirror: Writing Jewish History in a Digital Key*, which, by focusing on big data, aimed to “address the question whether DH corpora and methods will enable us to find a new common ground in the field of Jewish history” and reconsider its *longue durée*; the second on *New Philologies: Hebrew Manuscript and Print Cultures in a Digital Key* focused on editions and the application of machine learning.<sup>65</sup> In January 2021, the online journal *Reviews in Digital Humanities* published a special issue on Jewish Digital Humanities and since 2022 the *European Journal of Jewish Studies* has included a section dedicated to DH and Jewish Studies.<sup>66</sup>

In short, in recent years there have been several efforts to understand and discuss how the digital turn has affected Jewish Studies and what its intersection with digital humanities looks like. The present volume gathers selected papers from the international online conference #DHJewish – *Jewish Studies in the Digital Age*, which took place in January 2021 and was organized by the Luxembourg

---

**61** Conference: On the Same Page: Digital Approaches to Hebrew Manuscripts, last accessed March 20, 2018, <https://www.kcl.ac.uk/artshums/depts/trs/research/seminars/jewish/hebrew2015.aspx>.

**62** EAJS Roundtable Report, “Turning the Page: Jewish Print Cultures & Digital Humanities,” University of Amsterdam, February 2017, available online at: last accessed September 7, 2017, <https://www.eurojewishstudies.org/colloquia/eajs-programme-in-jewish-studies/eajs-roundtable-report-turning-the-page/>.

**63** This workshop was initiated by Gerben Zaagsma and funded by the Rothschild Foundation and organized in cooperation with Miriam Ruerup at the Institute for the History of the German Jews.

**64** See: <https://www.eurojewishstudies.org/digital-forum/eajs-digital-forum/>.

**65** See the abstracts for both sessions here: <https://www.eurojewishstudies.org/digital-forum/eajs-conference-2018/>.

**66** See: <https://reviewsindh.pubpub.org/v2-n1>; <https://brill.com/view/journals/ejjs/ejjs-overview.xml>.

Center for Contemporary and Digital History (C<sup>2</sup>DH).<sup>67</sup> The aim of the Luxembourg conference was to take stock of how the digitization boom of the last two decades, and the rapid advancement of digital tools to analyze data in myriad ways, have opened up new avenues for Jewish Studies research. It sought to answer the questions of how digital developments can be harnessed to address specific questions and problems in the field, and what the current state of the art looks like. Supported by an international program committee, it brought together more than 60 scholars and heritage practitioners to discuss how the digital turn affects the field of Jewish Studies.<sup>68</sup> Importantly, the conference was not a stand-alone event but part of a bigger project that includes the online portal *#DHJewish – Jewish Studies and Digital Humanities*, launched in June 2022. *#DHJewish* offers a database of projects, a news and events section, blog posts, and links to various relevant bibliographies as well as an online Zulip community.<sup>69</sup>

### 3 Sections of the Volume

The present volume contains papers based on presentations given during the 2021 *#DHJewish* conference, and is divided in four sections: Collections, Spatiality, Text, and Computational. This subdivision should be thought of in terms of where the main emphasis of the individual chapters lies, yet there are intersections in many ways. Thus, the first section, *Collections*, features chapters that take digital resources, and reflect upon their use in Jewish Studies, as their starting point. The chapters in the second section, *Spatiality*, all revolve around the affordances of spatial humanities approaches to understanding Jewish history and primary sources. The section *Text* features chapters that discuss various methods to engage with research focusing on and working with textual sources while the final section, *Computational*, includes chapters that all employ analytical methods derived from computational linguistics. Importantly, the various sections provide a mix of project-oriented case studies and research-oriented digital

---

<sup>67</sup> See: <https://www.c2dh.uni.lu/events/dhjewish-jewish-studies-digital-age>. The full archive of the conference with session recordings can be found here: <https://www.morressier.com/o/event/5fd2237e54bbb7f516f76f1b>.

<sup>68</sup> The program committee consisted of: Michelle Margolis, Rachel Deblinger, Karin Hofmeester, Gabor Kadar, Amalia Levi, Anna Menny, Miriam Ruerup, Sinai Rusinek, Avi Shmidman, Daniel Stoekl Ben Ezra, Dov Winer, Gerben Zaagsma (Chair), and Irene Zwiép. See also: <https://www.c2dh.uni.lu/events/dhjewish-jewish-studies-digital-age>.

<sup>69</sup> See: <https://dhjewish.org/>.

scholarship. As such, the present volume also seeks to provide a glimpse of the various directions that digital humanities work in Jewish Studies can take.

### 3.1 Collections

The first section, *Collections*, features four chapters and starts with the conference opening keynote lecture by **Jeffrey Shandler**, who takes the reader from the first recorded interviews with Holocaust survivors in Europe, conducted by US-based psychologist David Boder in the immediate aftermath of World War II, to today's new approaches in using immersive storytelling through new visualization techniques. Shandler shows us that the use of all material, whether “born analogue” or “digital” depends on the interaction of the user with the interviews. While each technology enables us to experience a different type of encounter with eyewitnesses, these are always embedded in our own knowledge and research questions, which frame our engagements.

Shandler's chapter is followed by that of **Inna Kizhner**, **Melissa Terras**, and their co-authors, who discuss the question of how Jewish culture is represented in museum collections. They provide us with a comparative survey of metadata on “Jewish” collections in the Metropolitan Museum of Art in the United States and the State Catalogue of Museum Collections of the Russian Federation that provide an entrance point into the complexities of international metadata standards and address the importance of universal standards to provide equal access to collections.

Following this analysis of how digital collections are constituted, **Jakub Mlynář**, **Jiří Kocián**, and **Karin Hofmeisterová** address the question of how users engage with them, specifically how search engines and search-query techniques shape our results. They present us with a small-scale study on how users at the Malach Centre for Visual History (CVHM) at the Charles University in Prague search in corpora of audiovisual Holocaust testimonies such as, among others, the Visual History Archive (VHA) and Fortunoff Video Archive for Holocaust Testimonies. Through their case study they show how search engines and search-query techniques shape our findings and, ultimately, “tools” thus produce “data.”

Finally, **Anna Bonazzi**'s essay delves into the challenges involved in indexing the content of digital resources. She discusses work to semi-automate content indexing and analysis of Holocaust testimonies based on N-grams. Traditional, manually assigned keyword-based indexing of testimonies emphasizes verbal content terms such as noun-based facts, names, and historical references that we expect survivors to use. Bonazzi argues for an alternative indexing system that is



not limited to the identification of keywords to summarize content and presents a semiautomated DH approach based on N-grams. This approach allows us to identify patterns and narrative structures that go unseen in traditional keyword-based indexing of the survivors' testimonies, including structural, non-verbal categories like uncertainty, reticence, and emotional insistence on time references.

## 3.2 Spatiality

In the second section, *Spatiality*, four chapters illustrate the breadth of spatial approaches that are current in Jewish Studies. The essay by **Sinja Clavadescher**, **Stefanie Mahrer** and **Stefanie Salvisberg** discusses the forced migration of Jewish academics from Nazi Germany within the context of a broader research project about Switzerland and academic forced migrants from 1933 to 1950. The research uses nodegoat to map the expulsion of academics and resulting transnational academic network in order to shed light on inner-institutional changes in respect to both academic staff and the academic standing of the research institutions involved.

**Maja Hultman** uses a GIS approach to debunk established historiographical narratives of a spatially inscribed, dichotomized Jewish urban experience in early 20th-century Stockholm. The project interrogates the supposed division between integrated, Reform, northern-residing Jews and Eastern European, poor, orthodox, southern-residing Jews. In this project, GIS is used as a tool to facilitate quantitative analysis of primary sources over the city's topography, in tandem with qualitative sources. Hultman explores the role of this unique topography in shaping complex Jewish approaches to social integration, religious practices, and communal relations.

**Piergabriele Mancuso's** essay highlights the centrality of archival collections and research for developing virtual reality and 3D modeling reconstructions. Using the Ghetto Mapping Project as a case study, Mancuso outlines the various and heterogeneous types of material used to assess not only the architectural features of the built environment, but also demographic and socioeconomic trends of the long presence of the Jewish community in the Florence ghetto, eventually seeking to understand the politics of segregation.

Finally, **Daniel Stein Kokin** presents a project that can simultaneously serve as a tool for research and pedagogy and as a political intervention that raises awareness of the long history of what we often take as a given – the “points” on our maps. Based upon maps and lists of settlements in the territory of Palestine and what today is Israel from the 1840s to the present, Stein Kokin shows how our contemporary topography is ultimately a temporary point – *nekudah* – on

the map which may have replaced another point before and might be followed by yet other points in the future. Ultimately, he problematizes the chronological matter-of-factness of what we see on our maps.

### 3.3 Text

The third section, *Text*, introduces a variety of methodological perspectives that can be brought to bear upon Jewish textual sources. **Benjamin Lee** reports on the use of machine learning techniques for extracting and analyzing visual content of early 20th-century Ladino newspapers. Lee scales up scholarship using the Newspaper Navigator tool to extract photographs, illustrations, maps, comics, and editorial cartoons alongside advertisements, and facilitate transnational analysis of the Sephardic Jewish experience. Beyond reporting on the actual work of creating and analyzing the dataset, Lee offers insights about interdisciplinary collaborations for digital humanities work in Jewish Studies, as well as reflections on ethical considerations when applying machine learning techniques to Jewish cultural heritage collections.

**Abby Gondek**'s essay explores the question of how a network analysis and visualization tool such as nodegoat can help us overcome biased perceptions of how political agendas were shaped. Her case study of Henrietta Stein Klotz, assistant to Henry Morgenthau Jr., Secretary of the US Treasury between 1934 and 1945, shows how Klotz influenced and shaped Morgenthau's positions in response to the Holocaust. Her sophisticated multi-layered network analysis allows her to trace the gendered dimensions of interpersonal networks and the political influence of actors that so often remain invisible.

**Zef Segal** analyzes the contents of the periodical *HaTz'fira* over a six-year period, before and after its transition from a weekly to a daily newspaper and shows what content changes in a newspaper can reveal about readers' interests and concerns. Segal uses topic modeling to show how local events and generational change led to a shift from more scientific content to a widening focus on world events, politics, and Jewish-related news.

**Tatsiana Astrouskaya**, finally, uses the well-known programming language R to study and analyze the correspondence of Russian refuseniks in their struggle to leave the Soviet Union. Focusing on the story of Ernst Markovich Levin, Astrouskaya analyzes the quantitative and the qualitative dimensions of his activities petitioning various authorities. Her argument-driven digital historical analysis shows how human and machine readings can complement each other also in relatively "small data" studies.

### 3.4 Computational

The final and most specialized section of the volume, *Computational*, features four chapters that showcase some of the latest developments in computational techniques as applied to Jewish manuscripts. Turning to a print from the 18th century for a highly structured corpus of texts from early manuscripts, **Luigi Bambaci** reminds us that data for 21st-century computational analysis can be found centuries earlier. Bambaci's chapter describes his work digitizing, parsing, and encoding the Kennicott Bible (1774–1776) to better analyze and understand textual elements in manuscripts of the Hebrew Bible up to constructing the stemmatic tree. One of the most difficult aspects of studying post-canonical Jewish texts is identifying biblical citations that are not exact. Historical writers of religious texts often cited the Bible but might play around with the citation to fit a poem or the context at hand.

**Avi Shmidman** presents an algorithm and tool to automatically detect biblical paraphrastic quotations in a given text, a non-trivial task when they are short and not identical to the Hebrew text. This groundbreaking work has already been shown to be a tremendous tool in textual research in Jewish Studies.

**Daria Vasyutinsky, Jihad El-Sana** and colleagues introduce their work in applying deep learning models to classify script types and sub-types in medieval Hebrew manuscripts. Incorporating, *inter alia*, the techniques and databases of Hebrew paleography their research project is part of a broader ongoing effort to develop algorithmic tools for processing historical documents.

Finally, **Joshua Waxman's** essay addresses the need for modern punctuated versions of classical Jewish texts which were often composed without punctuation. He describes an automatized system that was developed to create a punctuated version of the Hebrew and Aramaic of the Babylonian Talmud. This has the potential to assist greatly in Talmud use and study.

As we hope this introduction has made clear, the field of Jewish Studies has always been shaped by the uptake of new technologies. It is therefore important to acknowledge the groundbreaking and pioneering work that has led to our present moment and can be traced back to at least the 1950s. As Jewish Studies have now firmly moved into the digital age, we hope that the essays in this volume will enhance critical reflection on the methodological and epistemological consequences for our field and encourage the further uptake of digital approaches to bring about its full potential.

## References

- Baehne, G.W. *Practical Applications of the Punched Card Method in Colleges and Universities*. New York: Columbia University Press, 1935.
- Ben-Haim, Zeev. "On the Making of the Historical Dictionary of the Hebrew Language of the Academy of the Hebrew Language." *Leshonenu* 23 (1959): 102–23.
- Brazzo, Laura and Reto Speck. "Holocaust Research and Archives in the Digital Age: Introduction." *Quest. Issues in Contemporary Jewish History* 13 (2018): V–XIII.
- Burton, Dolores M. "Automated Concordances and Word Indexes: The Fifties." *Computers and the Humanities* 15, no. 1 (1981). <https://doi.org/10.1007/BF02404370>.
- Busa, Roberto. "The Annals of Humanities Computing: The Index Thomisticus." *Computers and the Humanities* 14, no. 2 (1980): 83–90. <https://doi.org/10.1007/bf02403798>.
- Busa, Roberto. "The Index of All Non Biblical Dead Sea Scrolls Published up to December 1957." *Revue de Qumrân* 2 (October 1958): 187–98.
- Chesner, Michelle. "JS/DH: An Introduction to Jewish Studies/ Digital Humanities Resources." *Judaica Librarianship* 20, no. 1 (2017). <https://doi.org/10.14263/2330-2976.1293>.
- Choueka, Yaacov. "Computerized Full-Text Retrieval Systems and Research in the Humanities: The Responsa Project." *Computers and the Humanities* 14, no. 3 (November 1, 1980): 153–69. <https://doi.org/10.1007/BF02403764>.
- Choueka, Yaacov. "Computerizing the Cairo Genizah: Aims, Methodologies and Achievements." *Ginzei Qedem* 8 (2012): 9–30.
- Conference: On the Same Page: Digital Approaches to Hebrew Manuscripts. Last accessed March 20, 2018. <https://www.kcl.ac.uk/artshums/depts/trs/research/seminars/jewish/hebrew2015.aspx>.
- EAJIS Roundtable Report. "Turning the Page: Jewish Print Cultures & Digital Humanities." University of Amsterdam, February 2017. Last accessed September 7, 2017. <https://www.eurojewishstudies.org/colloquia/eajs-programme-in-jewish-studies/eajs-roundtable-report-turning-the-page/>.
- Ekstein, Henry C. "How to Increase Effectiveness of Research in Jewish Studies." *Proceedings of the World Congress of Jewish Studies* (1969): 3–7.
- Grafton, Anthony. "Digitization and Its Discontents for Jewish History." A talk delivered at the International Conference *From Access to Integration: Digital Technologies and the Study of Jewish History Center for Jewish History*, New York, 2012.
- Hyman, Paula. "Recent Trends in European Jewish Historiography." *Journal of Modern History* 77 (2005): 345–56.
- Jacobs, Robert. "Jewish Archival Holdings in the Five New States of Germany: Creating an Inventory." *Judaica Librarianship* 8, no. 1 (1994): 17–22. <https://doi.org/10.14263/2330-2976.1222>.
- Jones, Steven E. *Roberto Busa, S.J., and the Emergence of Humanities Computing: The Priest and the Punched Cards*. Routledge: London, 2016.
- Kraft, Robert and Emmanuel Tov. "Computer-Assisted Tools for Septuagint Studies." *Bulletin of the International Organization of Septuagint and Cognate Studies* 14 (1981): 22–40.
- Kraft, Robert A., Emanuel Tov, and John R. Abercrombie. *Computer Assisted Tools for Septuagint Studies*. Atlanta, GA: Scholars Press, 1986.
- Krupp, Michael et al., *Mischna*, 7 vols. Jerusalem: Lee Achim, 2018.

- Lerner, Heidi. "New Technologies and Old Methodologies: Jewish Studies Research in the Digital Age." *Shofar: An Interdisciplinary Journal of Jewish Studies* 20, no. 4 (2002): 81–95. <https://doi.org/10.1353/sho.2002.0073>.
- Likforman-Sulem, Laurence, Henri Maître, and Colette Sirat. "An Expert Vision System for Analysis of Hebrew Characters and Authentication of Manuscripts." *Pattern Recognition* 24, no. 2 (1991): 121–37.
- Marienberg-Milikowsky, Itay. "Digital Research of Jewish Texts: Challenges and Opportunities." In *Textual Transmission in Contemporary Jewish Cultures*, edited by Avriel Bar-Levav and Uzi Rebhun, 15–25. New York: Oxford University Press, 2020. <https://doi.org/10.1093/oso/9780197516485.001.0001>.
- Merkin, R., Z. Busharia, and E. Meir. "The Historical Dictionary of the Hebrew Language." *Literary and Linguistic Computing* 4, no. 4 (January 1, 1989): 271–73. <https://doi.org/10.1093/lc/4.4.271>.
- Milikowsky, Chaim. "Scholarly Editions of Three Rabbinic Texts – One Critical and Two Digital." In *Advances in Digital Scholarly Editing*, edited by Peter Boot et al., 137–46. Leiden: Sidestone Press, 2017.
- Proceedings of the First International Colloquium Bible and Computer, The Text, Louvain-la-Neuve (Belgique) 2–3–4 September 1985*. Paris: Champion; Geneva: Sladkine, 1986.
- Rayward, W. Boyd, ed. *International Organisation and Dissemination of Knowledge: Selected Essays of Paul Otlet*. Amsterdam: Elsevier, 1990.
- Robison, Sophia and Joshua Starr. *Jewish Population Studies: Conference on Jewish Relations, New York, 1943*. New York: Conference on Jewish Relations, 1943.
- Rockwell, Geoffrey and Stefan Sinclair. "Tremendous Mechanical Labor: Father Busa's Algorithm." *DHQ* 14, no. 3 (2020). <http://www.digitalhumanities.org/dhq/vol/14/3/000456/000456.html>.
- Romm, Diane. "Retrieval of Judaica from Electronic Media: An Overview." *Judaica Librarianship* 8, no. 1–2 (1993): 61–63.
- Rosman, Moshe. *How Jewish Is Jewish History?* Oxford: Littman Library of Jewish Civilization, 2007.
- Schäfer, Peter, Hans-Jürgen Becker with Gottfried Reeg et al. *Synopse zum Talmud Yerushalmi*. 7 vols. TSAJ 31, 33, 35, 82, 83, 67, 47. Tübingen: Mohr-Siebeck, 1991–2001.
- Schäfer, Peter with Gottfried Reeg et al. *Konkordanz zur Hekhalot-Literatur*. 2 vols. TSAJ 12–13. Tübingen: Mohr-Siebeck, 1986 and 1988.
- Schäfer, Peter with Margarete Schlüter and Hans-Georg von Mutius. *Synopse zur Hekhalot-Literatur*. Texts and Studies in Ancient Judaism 2. Tübingen: Mohr-Siebeck, 1981.
- Shandler, Jeffrey. "From the President." *AJS Perspectives*, Fall (2012): 3–4.
- Shandler, Jeffrey. *Holocaust Memory in the Digital Age: Survivors' Stories and New Media Practices*. Stanford, CA: Stanford University Press, 2017.
- Shmidman, Avi, Shaltiel Shmidman, Moshe Koppel, and Yoav Goldberg. "Nakdan: Professional Hebrew Diacritizer." *ACL (demo)* (2020): 197–203.
- Shweka, Roni, Yaacov Choueka, Lior Wolf, and Nachum Dershowitz. "Veqarev otam ehad el ehad: Zihuy ktav yad vetseruf qit'ei hagnizah beemtsa'ut mahshev." *Ginzei Qedem* 7 (2011): 173–209.
- Sprondel, Johanna. "Toward a Humanities of the Digital? Reading Search Engines as a Concordance." In *The Making of the Humanities*, vol. 3, *The Modern Humanities*, edited by Rens Bod, Jaap Maat, and Thijs Weststeijn, 479–93. Amsterdam: Amsterdam University Press, 2014.

- Stökl Ben Ezra, Daniel, Bronson Brown-DeVost, Pawel Jablonski, Hayim Lapin, Benjamin Kiessling, and Elena Lolli. "BibLIA: A General Model for Medieval Hebrew Manuscripts and an Open Annotated Dataset." *HIP@ICDAR 2021*: 61–66.
- Tasman, Paul. *Indexing the Dead Sea Scrolls by Electronic Literary Data Processing Methods*. New York: IBM, 1958.
- Terras, Melissa and Julianne Nyhan. "Father Busa's Female Card Operatives." In *Debates in the Digital Humanities 2016*. <https://dhdebates.gc.cuny.edu/read/untitled/section/1e57217b-f262-4f25-806b-4fcf1548beb5>.
- Wallet, Bart and Irene Zwiep. "Session 0.8.I/II: Humanities in the Mirror: Writing Jewish History in a Digital Key." EAJIS Quadrennial Congress, Kraków, July 15–19, 2018.
- Weinberg, Bella Hass. "Judaica Librarianship in the Age of the Internet." *Judaica Librarianship* 9, no. 1–2 (1995): 3–5.
- Weinreich, Uriel. "Machine Aids in the Compilation of Linguistic Atlases." *American Philosophical Society Yearbook 1963* (1964): 622–25.
- Wintner, Shuly. "Hebrew Computational Linguistics: Past and Future." *Artificial Intelligence Review* 21, no. 2 (2004): 113–38.
- Yeivin, Israel. "Le dictionnaire historique de la langue hébraïque." *Meta* 43, no. 1 (1998): 19–26.
- Yosef, Itay Bar, Klara Kedem, Its'hak Dinstein, Malachi Beit-Arie, and Edna Engel. "Classification of Hebrew Calligraphic Handwriting Styles: Preliminary Results." *DIAL* (2004): 299–305.
- Zaagsma, Gerben. "#DHJewish – Jewish Studies in the Digital Age." *Medaon* 12 (2018): 1–11.
- Zaagsma, Gerben. Keynote lecture, "Exploring Jewish History in the Digital Age." *International Conference What's New, What's Next? Innovative Methods, New Sources, and Paradigm Shifts in Jewish Studies*. POLIN Museum of the History of Polish Jews, Warsaw. October 3–6, 2021. <https://polin.pl/en/keynotes-whats-new-whats-next>.
- Zaagsma, Gerben. Tagungsbericht *Jüdische Geschichte Digital*. 13.06.2013–14.06.2013, Hamburg. In *H-Soz-u-Kult*, September 10, 2013. Last accessed May 2, 2018. [www.hsozkult.de/conferencereport/id/tagungsberichte-5011](http://www.hsozkult.de/conferencereport/id/tagungsberichte-5011).