8

The Ethics of the Algorithm

Close and Distant Listening to the Shoah Foundation Visual History Archive

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I BEGIN with two sets of computer-generated visualizations: The first is the Digital Monument to the Jewish Community in the Netherlands (Figure 8.1).[1] It is a Holocaust memorial that has no physical or built counterpart; it exists only on the web. It is a digital image consisting of about 831,432 colored pixels (reproduced here in black-and-white). Each little box of pixels represents a single person, and they vary in size according to the age of the victim. The monument is a raster graphic, or bitmap, which is comprised of a rectangular grid of pixels viewable in a web browser on a computer monitor. The graphic represents more than 100,000 Dutch Jews who were killed by the Nazis. Clicking on an individual box brings a viewer to a web page containing information about the victims, including their names, dates of birth and death (if known), place of birth, and family members, including information about whether they survived the war or not. The graphic organization of the monument is based on the alphabetical order of the place of residence of the victims when they were deported.

The second computer-generated visualizations are based on the general indexing categories developed by the Shoah Foundation to organize the genocide-related concepts and experiences described in the 49,000 Jewish survivor testimonies in the Visual History Archive (Figures 8.2–8.5). These categories form the most general or highest level in the 50,000-word thesaurus created by the foundation, including: Captivity, Culture, Daily Life, Discrimination, Feelings and Thoughts, Movement, Organizations, People, Places, Politics and Economics, and Religion and

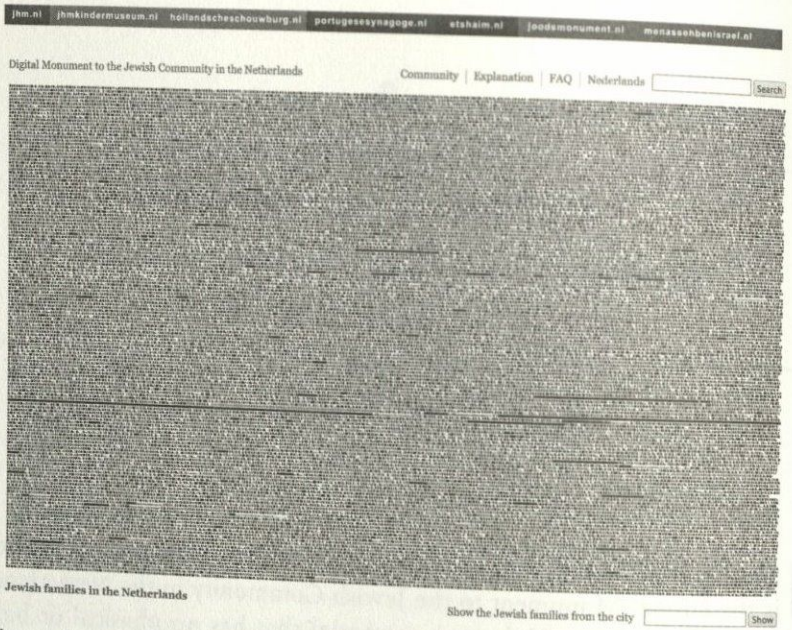

Figure 8.1. Digital Monument to the Jewish Community in the Netherlands (2005–2016).

Philosophy. Under each of these broad categories are hierarchical vocabularies to facilitate searching at a more precise level. For example, Captivity includes Camp Experiences and under that category, among other things, are camp adaptation methods, which are further broken down into camp barter, camp begging, camp betrayals, camp bribery, camp smuggling, and camp stealing.[2] Each visualization shows 200 different testimonies along the y-axis; time is shown along the x-axis, divided into one-minute segments (as per the indexing guidelines of the foundation). A black box means "yes" (that a given category was mentioned at that moment in the testimony) and a white box means "no" (that it was not). The length of the testimonies varies from under an hour to over fifteen hours in length, although the vast majority is around two hours. Any given segment can contain multiple keywords or indexing terms, thus a "black box" may appear at the same time marker across multiple categories.

A few things become apparent from these visualizations: Certain general categories (and, hence, their specific topics) crop up significantly more frequently in the course of the testimonies: Places, Organizations, and Activities are marked up (and presumably discussed) significantly

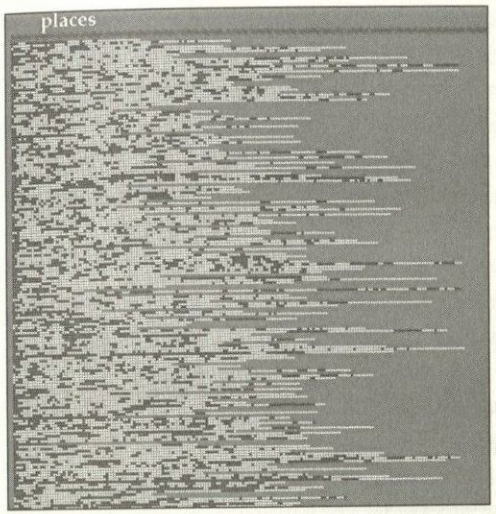

Figure 8.2. Mentions of the top-level category "places" by minute in 200 testimonies from the Shoah Foundation Visual History Archive.

more often than feelings, emotions, and attitudes. Almost all testimonies begin with the mention of place, which makes sense as a starting point for a survivor's life story. We can also track some general structural trends in the narrative arc of the testimonies: Discrimination tends to cluster in the first third of the testimonies, often keyed to life before or during the war, and Still and Moving Images tend to cluster in the final

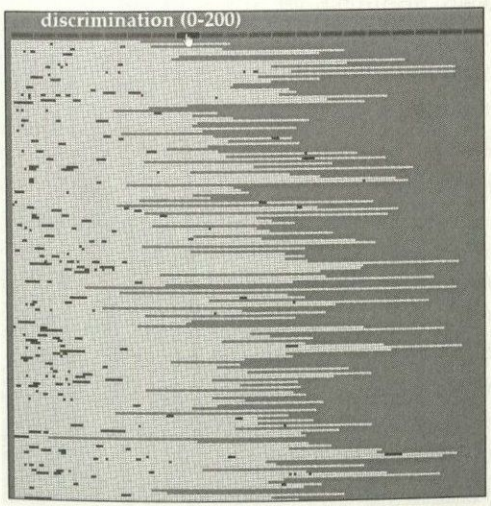

Figure 8.3. Mentions of the top-level category "discrimination" by minute in 200 testimonies from the Shoah Foundation Visual History Archive.

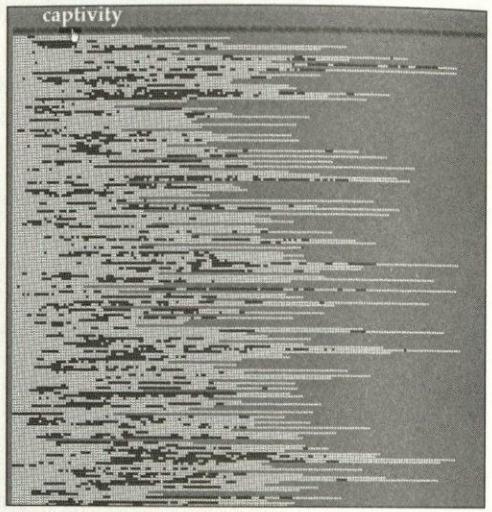

Figure 8.4. Mentions of the top-level category "captivity" by minute in 200 testimonies from the Shoah Foundation Visual History Archive.

third, often keyed to present-day life, pictures of family, and messages to the future. Part of the reason for this is that the goal of the interview was to produce a story-like narrative that followed the chronology of the survivor's life, beginning with experiences in the prewar period before moving to the war and the Holocaust, and, lastly, the postwar period, which concludes with a segment with family members and a future message.

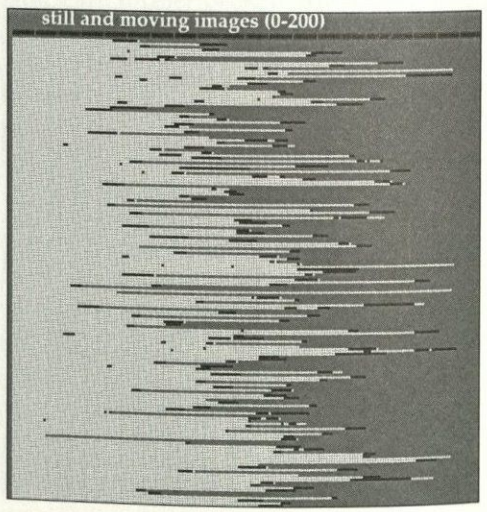

Figure 8.5. Mentions of the top-level category "still and moving images" by minute in 200 testimonies from the Shoah Foundation Visual History Archive.

While computer-generated data visualizations may illuminate certain commonalities, patterns, or structures through quantitative analyses, ethical questions immediately come to the foreground. These pixels signify Holocaust victims (in the first case) and the testimony of Holocaust survivors (in the second case). Even if we do not object to the "digitization," there is certainly some kind of "aestheticization" in the digital images' gridded, clean organization. To turn Holocaust victims into quantifiable entries in a database and to visualize their lives as data points using colored pixels on a bitmap is, on the face of it, problematic: It presents victims as numbers and digital colors; it abstracts and reduces the human complexity of the victims' lives to quantized units and structured data. In a word, it appears to be dehumanizing and, even worse, might even partake in the same rationalized logic of modernity that Zygmunt Bauman identified in his seminal work, *Modernity and the Holocaust,* as the condition of possibility for genocide, namely, the impulse to quantify, modularize, distantiate, technify, and bureaucratize the subjective individuality of human experience.[3] And, as we know from the work of Edwin Black, computational processing in the form of IBM's Hollerith punch card and card-sorting technologies automated the process of identifying Jews from census data, registration forms, and other governmental records, and these computational technologies were deployed in Germany and occupied countries throughout the Reich to manage, accelerate, and automate the annihilation of the Jews.[4]

Might, then, the realm of the "digital" and the "computational"—precisely because it is, by definition, dependent on algorithmic calculations, information processing, and discrete representations of data in digitized formats (such as numbers, letters, icons, and pixels)—present some kind of *limit* when it comes to responsible and ethical representations of the Holocaust? In other words, are the "digital" and the "computational" at loggerheads with the ethical, and, if not, what might "ethical" modes of computation look like in terms of digital interfaces, databases, and data visualizations? To answer these questions, I take both a close and a distant view of the Shoah Foundation Visual History Archive: The archive currently contains a total of 53,583 video testimonies (primarily of Jewish survivors of the Holocaust), in 39 languages, from 61 countries, amounting to more than 100,000 hours of testimony.[5] I have watched only a tiny fraction of the video testimonies, but have spent considerable time examining the significance of the metadata scaffolding and data management system, including the numerous patents for its information architecture,

which allow users to find and watch testimonies. This chapter is not another contribution to the debates over the relevance or reliability of survivor testimony for historical writing or the possibilities of navigating the blurred lines between history and memory in eyewitness accounts of the Holocaust; instead, it is an analysis of the *computational genre* itself in historical representation. This includes databases, structured data and queries, and all the algorithmic means by which data is mined, analyzed, and visualized. It seeks to locate the ethical in digital and computational modalities of representation—hence, the title: "The Ethics of the Algorithm."

Let us begin by considering what the question is to which these visualizations may be an answer. For the Digital Monument to the Jewish Community in the Netherlands the question might be: How could one create a visual representation of the entire Dutch Jewish community destroyed by the Nazis? This is a problem of scale, scope, and complexity, and the interface provides one answer: An interactive bitmap of hundreds of thousands of pixels connected to a database documenting every person. Without the visual interface, the database is still searchable by way of the tables containing structured data (name, place of birth, date of birth, date of death, family members, and so forth); however, the totality cannot be seen without an interface that visualizes the scope and scale of the database. In fact, given the infinitely extensible nature of the digital, the physical limitations of built memorials (construction materials, available land, and the legibility of inscriptions, among other things) are no longer an issue. One need only recall that one of the reasons the first winning proposal for the Berlin Holocaust Memorial by Christine Jackob-Marks was scrapped in 1995 was because there simply was not enough physical space to legibly inscribe the names of some 4.5 million identifiable victims.[6]

With the Shoah Foundation Visual History Archive, we are, of course, speaking about survivors, but the question of scale is equally daunting: With over 100,000 hours of survivor testimony, it would take a viewer 24 years to watch every testimony, assuming one watched 12 hours a day, 365 days of the year (and could understand 39 different languages). The scope of the archive—that is, its sheer scale measured in terms of hours of testimony—is not readily comprehensible to the human facilities of listening. Thus, the database exists to organize, categorize, and search the content of the testimony based on a series of parameters. The visualizations above attempt to extrapolate the "whole" of the data in the database (which is—and this is critically important—a very different thing than the "whole" of the event called "the Holocaust").

But such problems of scale and scope are not new or unique to these digital archives. In fact, many of the same problems of representation and human comprehension came to the foreground in attempts to create a mode of history writing and visual representation to capture "modernist events" of the twentieth century, which, according to Hayden White, seemed to be different from events that historians from Herodotus to Arthur Schlesinger typically wrote about.[7] Against the backdrop of the new experiences of mass death in World War I, Walter Benjamin wrote his famous essay on Nikolai Leskov, "The Storyteller," about the social and historical conditions of *impossibility* of certain modes of representation. He argues that we have lost "the ability to exchange experiences" or tell stories precisely because the scale, scope, and depth of modernist events does not reflect or cannot be captured by the structures of storytelling in a realistic mode of narration.[8] The experiences of the war event and mass death could no longer be observed, described, and communicated using the structures and meaning-making strategies reserved for historical realism, which was part and parcel of the tradition of storytelling with clear agents, a coherent plot, and narrative strategies characterized by the unities of time, place, and action that gave rise to the logic of a story. In other words, in modernism, we see a breakdown of the homology between real events *(Geschichte)* and the narrative strategies *(Historie)* used to represent, capture, communicate, and render these events meaningful.

With the Holocaust and other catastrophic modernist events, we are faced with several challenges for historical representation: The first concerns the scale, scope, and complexity of the events themselves; the second concerns the lack of homology between the reality of "what happened" and the modalities of representation, whether through narrative, visual, or computational techniques; and the third is the problem of limited human faculties to observe, comprehend, read, listen to, and finally adjudicate the vastness of the different accounts of the events in question. This, I would suggest, is the "data sublime" that both the Digital Monument to the Jewish Community in the Netherlands and the Shoah Foundation Visual History Archive are confronting through computational modes of representation. And yet, as I show here, the data sublime of the 100,000 hours of testimony provided by more than 50,000 survivors arranged in some 6 million tables of keywords in the database is structured

by an information management system that is remarkably literalist: It accounts for the reality of "what happened" without attending to the heterogeneity of testimony as a representational form about a modernist event. Even as the Shoah Foundation's database assures factuality and facilitates access and preservation, it has the side effect of flattening differences between the testimonies and rendering listening one-directional. As I argue here, computation—as a genre of historical representation that includes data, databases, algorithmic processing, and information visualization—can be used against itself, so to speak, to not only deconstruct assumptions of objectivity and mathematical certainty but also give rise to a renewed attention to the ethical. As such, far from simply replicating the structures of automation and information processing used in the planning and execution of the Holocaust, I argue that computation also contains the possibility of an ethics of the algorithm.

We need to begin with the specific genre of Holocaust video testimony because it is here that we can appreciate the conventional ethical imperatives structuring the creation, encounter with, and dissemination of survivor testimony. Much has been written on the history, significance, and media specificity of audiovisual Holocaust testimony.[9] As such, I can give only the briefest overview of that history here, focusing primarily on how the work of recording, archiving, and dissemination of Holocaust video testimony has been defined through a Jewish ethics of individualized listening and personal obligation.

One of the earliest efforts to videotape Holocaust survivors began in 1979, when Dori Laub and Laurel Vlock created the Yale Video Archive for Holocaust Testimonies. It was later named the Fortunoff Archive, and today has more than 4,400 testimonies and consists of some 10,000 hours of video. But oral history–recording projects of survivors and other documentary efforts to capture eyewitness testimony began in the immediate aftermath of the war, of which one of the earliest and most extensive was David Boder's wire-recorded audio narratives in displaced persons camps in 1946.[10] Many of the early testimonies in Yad Vashem's collection were recorded before it was established in 1953, and, today, Yad Vashem has an archive of 36,000 testimonies, of which 11,000 are video testimonies (the remainder being oral and written testimonies). Started in 1994 and funded by the Spielberg Foundation, the Shoah Foundation Visual History Archive, with more than 53,000 video testimonies and over 100,000 hours of testimony, is the largest such archive in the world.

It is not coincidental, as Annette Wieviorka points out, that the impulse to record audiovisual testimonies in the late 1970s and early 1980s was spurred by televisual realities, ones that go back to the immediacy of first-person accounts by survivors at the Eichmann trial and go forward to the public impact of the television miniseries *Holocaust* in 1979, and, later, the global success of *Schindler's List* in the early 1990s.[11] But the visual power of televisual and cinematic modes of presenting and representing history is, as we know, not only alluring and captivating but also demands an interrogation of the reality effect produced by such ways of seeing and experiencing.

Geoffrey Hartman, one of the founders and project directors of the Yale archive, has written extensively on the ethical dimensions of video testimony and distills the essential meaning of video testimony to be about the "duty to listen and to restore a dialogue."[12] For Hartman, video testimony offers what he calls an "optic" for viewers to immediately experience their nonexperience of the Holocaust: That is to say, it mediates the geographic, temporal, experiential, and psychological remove that most of us have with the events of the Holocaust. This happens first through the relationship between the interviewers and the survivors and then through the generations of viewers who contribute to the creation of an "affective community" of witnesses to the witnesses.[13]

Martin Buber's "Ich-Du" relationship provides a widely adopted expression of the ethical performance of testimony, in which the listener and the survivor, in Laub's words, enter into a "contract" through listening, bearing witness, and being heard.[14] Every survivor, writes Laub, has a need to be heard, to tell his or her story to a listener who is actively present for the other, listening to both silence and speech, trauma and survivorship.[15] "The unlistened-to story," as in Primo Levi's recurring nightmare in *Survival in Auschwitz,* is a trauma akin to reexperiencing the event itself.[16] In essence, video testimony—insofar as it instantiates a relationship of intersubjective relationality through the Ich-Du pact between the survivor and the listener—becomes a practice of ethics as a relation of obligation and responsibility to the other. Bearing witness, then, is as much a testimony of the self as it is a testimony for the other, and Hartman will explicitly situate it within a framework derived from Emmanuel Levinas. For Hartman, testimony implies a "covenant" between the self and the other, one that is in the face of an "infinite demand." "Ethical testimony" is, for him, about being present: "Here I am"—I am ready to listen, I am attentive, I am all ears, I am standing open, ready to be summoning to

this infinite demand, to this injunction to "hear" (the central prayer of Judaism, Shema Israel).[17]

While there is nothing inherently or exclusively "Jewish" about the ethics of testimony, the philosophy of Levinas, perhaps more than any other, has informed much postwar thinking about ethics as obligation and responsibility to the other. In survivor testimony, it is the physical face of the other—the traumatized, wounded face of the survivor—which calls forth in its alterity and infinity. The face of the survivor is a face of difference and rupture, but one that is brought into a relationship of proximity, vulnerability, and closeness with the listener's own face. For Levinas, ethics—defined as the relation to the other—is "the first philosophy," prior to any ontological structure, origin, or attempt to ground being. It is not coincidental that Hartman will use the term "optics" to highlight the media specificity of video testimony, since Levinas will use the same term, "optics," to define ethics as a relation of seeing and being for the other.[18] Indeed, Levinas's greatest works, *Totality and Infinity* and *Otherwise than Being,* posit a philosophy of ethics as a relationship to the other, such that the other is never reduced to the same, which he considers to be the violently universalizing or totalizing impulse of ontology. Ontology is "a philosophy of power," violence, and injustice because it subordinates and even negates the relationship of the subject to the other.[19] Ethics is a relationship of vulnerability marked by responsibility to and difference from the other, perhaps most notably in the fragile relationship between survivor and listener.

But what place, if any, does Levinas have in the realm of the computational, where relationships are characterized by data placed within tables and fields in a database to be queried, displayed, and visualized? And, simultaneously, we may ask what place, if any, does the computational have in the realm of listening to survivor testimonies? What would it mean for a computer to "watch," "hear," and "listen to" testimonies? What might be seen or heard beyond the faculties of human cognition and the optics of human perception? These are the questions to which we now turn as we delve into the Visual History Archive (VHA).

While the media specificity of the first generation of Holocaust testimony has been discussed at great length—ranging from Boder's wire recordings to cassette tape and audiovisual documentation—there is virtually no literature on the digitization of the Holocaust archive and its transformation into an information management system. With regard to the Shoah

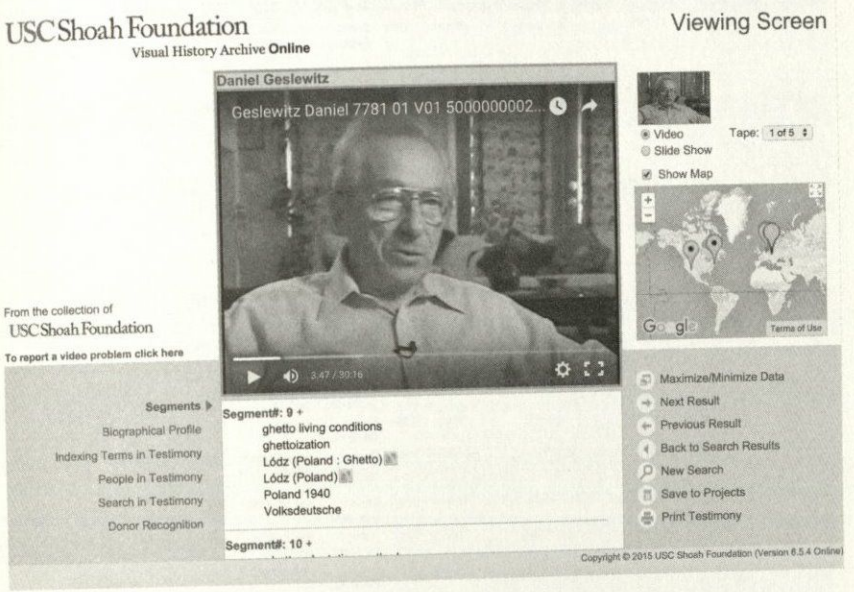

Figure 8.6. Screenshot of testimony of Daniel Geslewitz.

Foundation VHA, this is particularly noteworthy because the very condition of possibility for watching any testimony is the information architecture standing behind the testimonies themselves. This information architecture consists of several components: First, there is the interface itself, which runs in a web browser, allowing a user to type in keywords, names, and other search terms in order to listen to segments of testimony (Figure 8.6); behind that is a relational and structured query language (SQL) database in which content is organized into tables, records, and fields (Figure 8.7); all of this data was input after the videos themselves were indexed with keywords and other associated information was manually entered (such as the information on the preinterview questionnaires that each survivor had to fill out before the interview took place). But before this indexing could happen, standards and protocols—which were derived from the National Information Standards Organization's Z39.19 standard for the construction, format, and management of monolingual controlled vocabularies—provided the guidelines for what and how to index the content of the videos.[20] The standard governed the creation of a unique thesaurus to achieve consistency in the description of the content through a controlled vocabulary and thereby facilitate its

SegmentID	segment_no	KeywordID	highest_parent_id	TestimonyID	intCode	TapeLabel	Label	StartDate	EndDate
71909	8	5950	43485	7019	7781	Daniel Geslewitz	German invasion of Poland (September 1, 1939)	NULL	NULL
71909	8	10435	25855	7019	7781	Daniel Geslewitz	anti-Jewish measures	NULL	NULL
71909	8	10844	5526	7019	7781	Daniel Geslewitz	German occupation conditions	NULL	NULL
71909	8	12754	1957	7019	7781	Daniel Geslewitz	Lódz (Poland)	NULL	NULL
71909	8	14228	1957	7019	7781	Daniel Geslewitz	Poland 1939 (September 1 - December 31)	NULL	NULL
71909	8	14272	5784	7019	7781	Daniel Geslewitz	politico-military event awareness	NULL	NULL
71909	8	15078	78826	7019	7781	Daniel Geslewitz	synagogue attacks	NULL	NULL
71909	8	17245	78826	7019	7781	Daniel Geslewitz	property seizure	NULL	NULL
71909	8	17247	12460	7019	7781	Daniel Geslewitz	betrayals	NULL	NULL
71917	9	8057	5267	7019	7781	Daniel Geslewitz	Lódz (Poland : Ghetto)	1940-02-08 00:00:00	1944-08-03 00:00:00
71917	9	9323	15267	7019	7781	Daniel Geslewitz	ghettoization	NULL	NULL
71917	9	9545	5526	7019	7781	Daniel Geslewitz	ghetto living conditions	NULL	NULL
71917	9	12162	3985	7019	7781	Daniel Geslewitz	Volksdeutsche	NULL	NULL
71917	9	12754	1957	7019	7781	Daniel Geslewitz	Lódz (Poland)	NULL	NULL
71917	9	14229	1957	7019	7781	Daniel Geslewitz	Poland 1940	NULL	NULL
71923	10	8057	5267	7019	7781	Daniel Geslewitz	Lódz (Poland : Ghetto)	1940-02-08 00:00:00	1944-08-03 00:00:00
71923	10	10801	3985	7019	7781	Daniel Geslewitz	Rumkowski, Chaim	NULL	NULL
71923	10	13856	15267	7019	7781	Daniel Geslewitz	ghetto procedures	NULL	NULL
71923	10	14225	1957	7019	7781	Daniel Geslewitz	Poland 1941 (June 21) - 1944 (July 21)	1941-06-21 00:00:00	1944-07-21 00:00:00
71923	10	14265	1957	7019	7781	Daniel Geslewitz	ghetto workshops	NULL	NULL
71923	10	14378	15267	7019	7781	Daniel Geslewitz	ghetto adaptation methods	NULL	NULL
71923	10	15073	5599	7019	7781	Daniel Geslewitz	ghetto food acquisition	NULL	NULL
71923	10	15269	15267	7019	7781	Daniel Geslewitz	ghetto Judenräte	NULL	NULL
71933	11	8057	5267	7019	7781	Daniel Geslewitz	Lódz (Poland : Ghetto)	1940-02-08 00:00:00	1944-08-03 00:00:00
71933	11	9545	5526	7019	7781	Daniel Geslewitz	ghetto living conditions	NULL	NULL

Figure 8.7. Screenshot of database with data relating to the testimony of Daniel Geslewitz.

search and retrieval. A special piece of software called a video indexing application or a cataloging facility was developed to do this.[21] Beyond this, we have the hardware, such as the archive servers and storage servers, where the videos are stored in digital formats for streaming in a video player.

DateAdded	IsParent	TypeID	TypeLabel	AVideoID	AVideoDescription	MapID	MapDescription	InTimeCode	OutTimeCode
1995-12-08 15:52:00	0	5621	German military invasions	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1995-12-15 18:25:00	1	5203	anti-Jewish regulations	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1996-01-25 21:07:00	0	3931	living conditions	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1996-09-26 20:18:00	0	5872	cities in Poland: verified	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1996-12-09 10:55:00	0	5677	countries by time period	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1996-12-09 22:28:00	0	5651	awareness	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1997-02-24 14:48:00	0	2264	anti-Jewish property attacks	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1998-03-19 20:30:00	1	5907	confiscations	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1998-03-19 20:47:00	1	5472	betrayal	NULL	NULL	NULL	NULL	02:02:33:12	02:08:25:13
1995-12-08 15:52:00	0	5819	ghettos in Poland: verified	NULL	NULL	NULL	NULL	02:08:25:13	02:13:53:03
1995-12-08 15:52:00	1	3612	ghetto procedures	NULL	NULL	NULL	NULL	02:08:25:13	02:13:53:03
1995-12-08 15:52:00	1	3931	living conditions	NULL	NULL	NULL	NULL	02:08:25:13	02:13:53:03
1996-05-03 18:27:00	0	149	ethnic and/or religious groups	NULL	NULL	NULL	NULL	02:08:25:13	02:13:53:03
1996-09-26 20:18:00	0	5872	cities in Poland: verified	NULL	NULL	NULL	NULL	02:08:25:13	02:13:53:03
1996-12-09 11:00:00	0	5677	countries by time period	NULL	NULL	NULL	NULL	02:08:25:13	02:13:53:03
1995-12-08 15:52:00	0	5819	ghettos in Poland: verified	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1996-01-24 21:16:00	0	5238	famous people	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1996-11-14 14:01:00	1	3612	ghetto procedures	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1996-12-09 10:30:00	1	5677	countries by time period	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1996-12-09 21:27:00	0	2780	industrial sites	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1996-12-12 21:59:00	1	7137	adaptation	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1997-02-24 14:16:00	0	5413	food acquisition	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1997-03-14 15:41:00	0	5365	Judenräte	NULL	NULL	NULL	NULL	02:13:53:03	02:22:42:15
1995-12-08 15:52:00	0	5819	ghettos in Poland: verified	NULL	NULL	NULL	NULL	02:22:42:15	02:25:18:15
1995-12-08 15:52:00	1	3931	living conditions	NULL	NULL	NULL	NULL	02:22:42:15	02:25:18:15

As such, for every survivor, we have two texts: first, the video testimony itself and, second, the data in the database about the testimony. With regard to the latter, every survivor is assigned a testimony ID, and his or her testimony is broken into segments, which are generally one minute in length. Each segment is assigned a segment ID that is correlated

with a keyword ID, which, in turn, corresponds further to a type label in the index hierarchy. The effect is to turn the narrative into data amenable to computational processing. Significantly, this process is exactly the opposite of what historians usually do, namely, to create narratives from data by emploting source material, evidence, and established facts into a narrative.

The global architecture of the Shoah Foundation's Digital Library System was developed by Samuel Gustman, the chief technology officer, and consists of the following elements: data capture (starting with the transfer of the videotape to digital format and cataloging) to the storage of data (both the videos themselves and the indexing server that knows where all the catalog metadata is) and, finally, the interface to play, search for, and distribute data and its related content. In what follows, I focus on that realm of information architecture between the user interface and the server storage—in other words, the metadata, the data structures, and the database. It is precisely here that we see a fundamental dissociation of the presentation of the content (that is, the testimonies and the interface to watch them) from the information architecture, database, and metadata scaffolding that lies behind the content. Such a dissociation is not unique to the VHA but bespeaks a common practice in digital library systems and computation more generally, stretching back to Claude Shannon's theory of information as content neutral.[22] In the words of media theorist Alan Liu applying the principles of Friedrich Kittler, what we are witnessing is emblematic of "the discourse network 2000":[23] a mode of organizing information characterized by the "separation of content from material instantiation . . . [such that] the content management at the source and consumption management at the terminus [are] double-blind to each other."[24] In essence, the content of the testimonies knows nothing of the information architecture, and the information architecture knows nothing of the testimonies. In this sense, the database aims to be an empty, neutral bucket to put content in, and the goal of the information system is to transmit this content as noiselessly as possible to a receiver or listener.

Between 1996 and 2002, ten separate patents were filed by inventor Samuel Gustman and the Survivors of the Shoah Visual History Foundation, the assignee, for the VHA information architecture. The inventions include the following: a Method and Apparatus for Cataloguing Multimedia Data; several patents for a Method and Apparatus for Management of Multimedia Assets; a Digital Library System; and, finally, a

Method and Apparatus for Cataloguing Multimedia Data. Some of the patents—such as the "Digital Library System" and "Methods and Apparatus for Management of Multimedia Assets"—have been referenced by more than seventy other patents from companies such as Xerox (for developing a browser-based image storage and processing system) and Microsoft (for semiautomatic annotation of multimedia objects). In 2011, the Shoah Foundation granted an exclusive right to all ten of its patents to a company called Preservation Technologies, a company with a specialty in audiovisual preservation, media transfer, digital archiving, and media streaming.[25]

The first patent, "A Method and Apparatus for Cataloguing Multimedia Data," was filed in 1996 and established the method for indexing the testimonies and creating a search and retrieval system for their playback. I quote the summary of the invention: "The invention catalogues data such as multimedia data. A catalogue is a collection of one or more catalogue elements. An index is used to access a catalogue. An element of a catalogue has one or more attributes. An attribute provides information that can be used to search for, answer questions about, and navigate through a catalogue. . . . Attribute elements and attributes are used to build an index that can be used to facilitate catalogue access."[26] This summary can be elucidated using a diagram from the patent itself (Figure 8.8): At the top are video segments, generally chunked into one-minute units; they contain narrative elements (sentences and phases) said by the survivor; these phrases have a number of different attributes—they mention particular people (and the particular information about the person is stored in the database); they contain particular keywords (which may already exist in the thesaurus, or may need to be added, hence, "proposed keywords"); and, most important, the keywords have a certain hierarchy in that they can be contained in more general "types." Altogether, the keywords and types form a catalog consisting of an index of attributes connected to phrases uttered during segments of video. This is the metadata scaffolding or "metatext" that resides behind the videos themselves. In the words of Johanna Drucker on the significance of such metadata structures, "arguably, few other textual forms will have greater impact on the way we read, receive, search, access, use, and engage with the primary materials of humanities studies than the metadata structures that organize and present that knowledge in digital form."[27] This is certainly true of the VHA, whose knowledge model, as we will see, is fundamentally aimed at the transformation and disambiguation of narrative

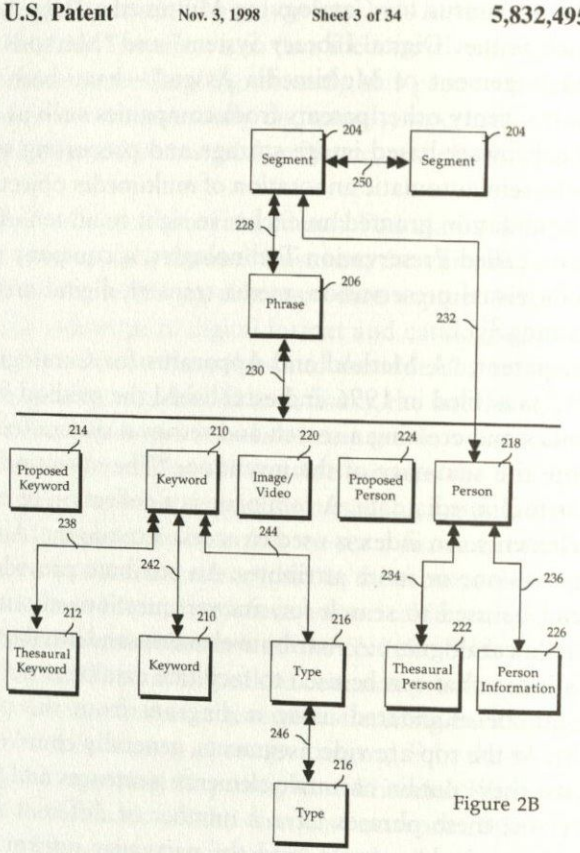

Figure 8.8. Drawing from Samuel Gustman, "Method and Apparatus for Cataloguing Multimedia Data," U.S. Patent 5,832,495 (November 3, 1998).

into data that makes it amenable to computational processing and structured logic. It is a process that can be called "defiguration"—precisely because it evacuates all traces of the figurative in its literalism.

Within the index, there are three different kinds of relationships that can exist between any two (or more) indexing elements, and these relationships form the "pillar" of the index, according to Gustman: inheritance, whole/part, and associative relationships.[28] Inheritance relationships are characterized by "is a" (for example, in the patent, he writes a "Ford Bronco" is a "car," where the specific keyword is "Ford Bronco" and the type is a

"car").[29] The second relationship is whole/part (for example, cars and tires); and the third relationship is associative (such as "car" and "driver"—where neither "is" the other and they are not in a whole/part relationship). As I mentioned earlier, these principles derive from the application of a specific standard (Z39.19) to consistently and unambiguously describe "content objects" (the survivor testimonies) in order to produce a monolingual controlled vocabulary (the thesaurus) to facilitate their search and retrieval.[30] The goal of the standard, as explained in its documentation, is to provide "guidelines for the selection, formulation, organization, and display of terms that together make up a controlled vocabulary" for the purposes of "knowledge management" and "knowledge organization."[31] The indexing terms are generally nouns and form subject headings, underneath of which one finds keywords in various relationships (inheritance or hierarchical, whole/part, and associative).

It is important to underscore that none of the testimonies in the Shoah Foundation VHA was automatically tagged with keywords; instead, every component of the cataloging system—from the development of the indexing terms and the thesaurus to the database itself—was created by the staff working at the foundation who listened to all the testimonies and indexed them according to the guidelines developed by the foundation. This is because there are currently no transcripts of the Holocaust testimonies. In fact, the keyword indexing system—which consists of a thesaurus term (or terms) linked to a particular segment of video—is the *only* way to search the content of the testimonies. On average, testimonies have about 120 indexed terms associated with one-minute segments (although many have more and some less), yielding about 6.2 million tables of data.

To develop the metadata, the Shoah Foundation employed about fifty indexers who worked for several years watching each and every video using a specially developed application (also patented) that allowed the human indexer to assign a keyword to a video segment. Keywords were assigned to the narrative content of the video from the thesaurus and, at the same time, new keywords could be proposed to describe experiences not already in the thesaurus.[32] For the first 5,000 testimonies, the segments were variable in length and could be determined by the indexer; however, this was quickly replaced by another system (used for the remaining 46,000 plus testimonies), in which the Video Indexing Application would automatically "chunk up" the testimony into discrete, one-minute segments and prompt the indexer to assign a keyword. The

"chunking" of the video was automated, but the assignment of the keyword was determined by a human listener. Not every minute segment, however, has a keyword, something that generally indicates the continuation of the previous keyword but, according to the Shoah Foundation staff, may also mean "the lack of indexable content."[33] Lack of indexable content can mean many things, ranging from an interviewer asking a question to a survivor repeating him or herself, a pause in the conversation to reflect or search for the right words, an emotional moment, noise, silence, or even content that the indexer may not want to draw attention to (such as racist sentiments against Hispanics, for example, in one testimony). In other words, indexable content is manifest content, in a declarative or imperative mode—in general, what is literally and objectively said. Altogether, the indexing system produces a kind of "normative story" (purged of certain contingencies and unwanted elements) in which—on the level of the data in the database—many of the testimonies, but certainly not all, become quite like each other.[34]

The result is a massive data ontology that has expelled the latent content, the performative, the figural, the subjunctive, the tone of questioning and doubt, the expressiveness of the face, and the very acts of telling (and failing to tell) that mark the contingency of all communication. And while its aim is objectivity, it is important to underscore that a human listener decided what to index and what not to index; a human listener decided what indexing term to use and what indexing term not to use; and a human listener decided if a given narrative segment could be described by a keyword or not. This is a fundamentally interpretative process. The result is the removal of the potentialities of the narrative in the application of the data ontology. In the end, it has the effect of turning the narrative into data. In this regard, it is exactly the opposite of the problem that Berel Lang bemoaned about the use of figurative language and aestheticization "adding to" the factual reality of the events;[35] here, we are speaking about "subtracting from" or "abstracting of" the narrative as told by the survivors. In other words, what goes missing in the "pursued objectivity" of the database is narrativity itself[36]—from the dialogical emplotment of the events in sentences, phrases, and words in response to the interviewer's questions; to the tone, rhythm, and cadence of the voice; to the physical gestures, emotive qualities, and even the face itself.

Of course, this is because databases are not narratives or people telling stories; instead, they are formed from data (such as keywords) arranged in relational tables that can be queried, sorted, and viewed in relation to

tables of other data. The relationships are foremost paradigmatic or associative relations, to use Ferdinand de Saussure's terms, since they involve rules that govern the selection or substitutability of terms, rather than the syntagmatic, or combinatory elements, that give rise to narrative.[37] Database queries are, by definition, algorithms to select data according to a set of parameters. Whenever I enter a search string in the Shoah Foundation interface, I am performing an SQL query based on parameters that can be searched.

"Indeterminate data," such as "nonindexable content," must be given either a null value or not represented at all. How would emotion, for example, need to be represented to allow database queries? While certain feelings such as helplessness, fear, abandonment, and attitudes are tagged in the database, it would be challenging to mark up emotion into a set of tables and parse it according to inheritance structures (sadness, happiness, fear, and so forth, all of which are different kinds of emotions), associative relationships (such as happiness linked to liberation, or tears to sadness and loss), and quantifiable degrees of intensity and expressiveness: (1) weeping gently, (2) crying, (3) sobbing, (4) bawling, and (5) inconsolable. While we might quickly unpack the futility (not to mention the insensitivity) of such a pursuit, there are precedents for quantified approaches to cataloging trauma, including a method developed by David Boder following his analyses of the interviews he conducted with survivors in displaced persons camps.[38] Needless to say, databases can only accommodate unambiguous enumeration, clear attributes, and definitive data values; *everything else is not in the database.* The point here is not to build a bigger, better, more totalizing database, but that database as a genre always reaches its limits precisely at the limits of the data collected (or extracted, or indexed, or variously marked up) and the relationships that govern these data. We need narrative to interpret, understand, and make sense of data.

So that leaves us with a critical question: What do we need databases for? With regard to the Shoah Foundation VHA, the database exists to provide meaningful access to the testimonies on a scale that is both tailored and comprehensible to a human viewer whose faculties of attention and knowledge (most likely) preclude twenty-four years of viewing and listening. In other words, a database and, hence, the very genre of computational representation exists, first of all, to manage scale. Second, as I show in the following, a relational database, by definition, functions by virtue of the relations or cross-connections between the data in the

database. As such, the database can gave rise to infinitely many search queries and thereby allow innumerable combinations that identify larger thematic issues, reveal patterns and structures, and create new associations between experiences that may not otherwise be considered together. And, finally, computational analysis can provide insights and ethical perspectives that human listening cannot, precisely by the way in which it allows a kind of "distant listening" based on the whole of the archive rather than a selection of representative or even canonical testimonies.

The visualization (Figure 8.9) and the detail (Figure 8.10) are examples of network relations based on just one hundred testimonies, in which names are connected to keywords mentioned in the testimonies. The large circles (nodes) are survivors and all the lines (edges) that extend out from them are keywords used not only in their testimony but also in the testimony of other survivors. The thicker the line, the higher the frequency of use; the larger the circle, the more keywords are associated with the person. Keywords at the center are more common (and this also moves the person to the center); keywords describing less common experiences gravitate toward the periphery. In this particular example, one survivor, Arie Leopold Haas, appears on the periphery with comparatively fewer lines connecting the keywords in his testimony to those of other survivors. Perhaps this is because the experiences he describes in his testimony—being an Italian Jew who was hidden, who converted to Christianity, and who attended church—are ones that are less typical, at least when compared to the experiences of others in the archive. In fact, when querying the full database, we find that only 366 testimonies of Jewish survivors (out of more than 49,000) are tagged with the keyword "church attendance."

The graphic was generated by a data visualization program called Gephi, which algorithmically determines "communities" based on topics mentioned. From the one hundred testimonies, it detected sixteen different communities. In some cases, these "communities" appear to be based on nationality (Russian and Ukrainian), but in other cases, they seem to be based on places mentioned in the testimony or shared experiences. Visualizations like these might provide new starting points for delving into the more than 6 million records in the database and seeing connections that a human eye could not possibly detect or track. In this particular case, we might be able to identify "outlier" experiences or noncanonical stories that help us reassess certain assumptions or provide a more differentiated set of perspectives.

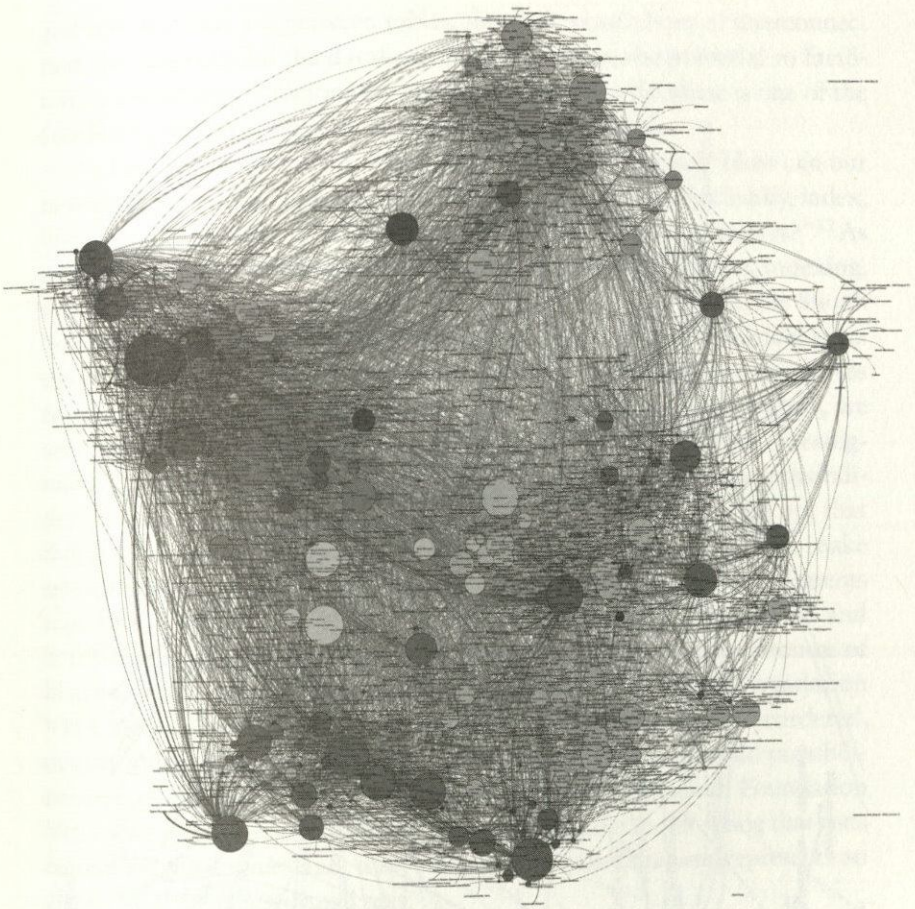

Figure 8.9. Network visualization of 100 testimonies and associated keywords.

The querying of the database, particularly through faceted searching that allows a user to apply multiple filters, can reveal sites of overlap and linkages between experiences. I would contend that the possibility of infinite "queryability" and visualization of the relations in a database is, in fact, a critical part of its ethical dimension. Consider, for a moment, the alternative: 52,000 atomized testimonies searchable by unique identifiers such as name or record ID, but without the ability to traverse orthogonally through the tables. The more "thick" the possible relations

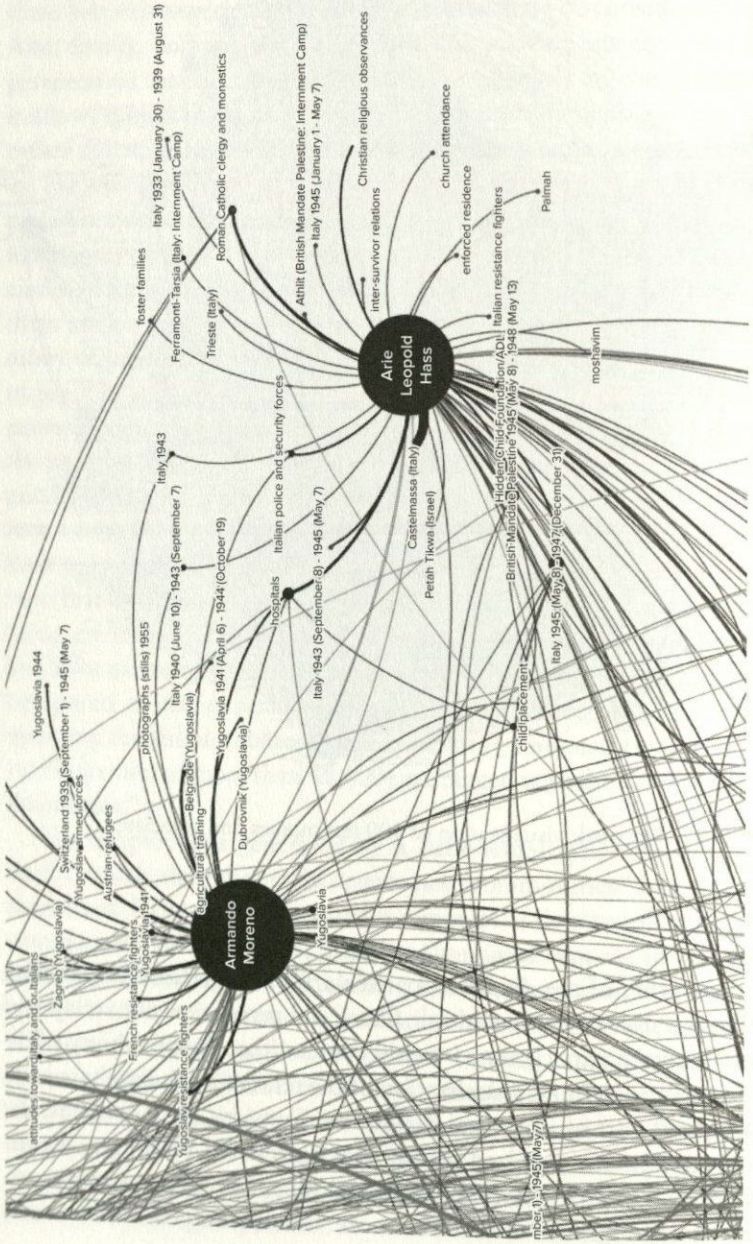

Figure 8.10. Detail of network visualization.

and intersections are between tables, the more possibilities of interconnection, the more ethical the database. In other words, the potential to facilitate an ever-deeper relationality among the data in a database is one of the conditions of possibility for an ethics of the algorithm.

As Lev Manovich asks in *The Language of New Media:* "How can our new abilities to store vast amounts of data, to automatically classify, index, link, search, and instantly retrieve it, lead to new kinds of narratives?"[39] As an explicit uptake of Manovich's question of how classification, indexing, search, interlinking, and retrieval can lead to new narratives, the Shoah Foundation VHA allows users to create their own project narratives from the search results, essentially, building remixed and hybridized narratives from any number of constitutive narrative segments. In this regard, we see a symbiosis between narrative and database, such that the paradigmatic structure of the database contributes to the syntagmatic possibilities of combination at the heart of narrative.[40] And I would point out that this is not fundamentally different from what historians already do: make selections from the trove of archival sources in order to combine elements together to form a narrative. The database performs this selection and combinatory process in every query and, hence, literalizes an instance of historical emplotment. The metadata database of the Shoah Foundation VHA thus represents a kind of "paratext" insofar as it can be reordered, disassembled, and reassembled according to the constraints and possibilities of computational logic.[41] The visualizations of the Shoah Foundation VHA are representations of the paratext, the metadata scaffolding that runs behind the testimonies and, with every query to the database, represents an algorithmically transformed text.

In a computational mode of representation, it is common to "toggle" between the singular and the global, the individual experiences of particular eyewitnesses and all the experiences as recounted by the survivors, which, in this case, is the summation of all the data in the VHA. The latter does not represent the reality of "the Holocaust" (as a complete or total event), but rather the totality of the archive, and therefore can only present structures, patterns, and globally oriented visualizations of data. But, again, this is not very different from what historians do, insofar as they emplot events at various levels of "zoom" in order to convey different kinds of meaning. In other words, we "toggle" back and forth between macrolevel accounts of the totality of the event (zoomed out) and microlevel accounts of individual experiences (zoomed in), which are, by their very nature, defined by specific experiences, perspectives, spectatorship,

language, and so forth. Saul Friedländer's "globally oriented inquiry" into the history of the Holocaust not only examines the encompassing "ideological-cultural factors" and mythologies of the Nazi regime while recounting the totality of events, actions, and numbers to convey the overwhelming efficiency and scope of the destruction, but he also calls on the individual voices and personal chronicles of diary and letter writers "to illuminate parts of the landscape . . . like lightning flashes," and thereby "pierce the (mostly involuntary) smugness of scholarly detachment and 'objectivity.' "[42] In essence, there are certain parallels between the compositional practices of historians and those of computation.

But the computational mode also allows another kind of reading and listening practice, which is quite different from what individual readers and listeners tend to do with memoirs and video testimony. The computational allows us to perform what literary scholar Franco Moretti has termed "distant reading"—a practice that moves away from the close, hermeneutical reading of texts in favor of an algorithmic approach that presents overarching structures and patterns.[43] For Moretti, distance is "a condition of knowledge" because it allows a scholar to "focus on units that are much smaller or much larger than the text: devices, themes, tropes—or genres and systems."[44] In other words, the perspective of distance allows us to see different things than the perspective of closeness (characterized by close, attentive, detailed reading). By confronting scale, "distant reading"—or, in our case, "distant listening"—reveals structures, patterns, and trends that are not discernable when the focus remains on just a handful of close readings of individual texts. And the stakes are much higher than just revealing structures: distant listening facilitates whole corpus analysis and, potentially, the democratization of knowledge. Instead of privileging "human listening" (in which we necessarily have to limit ourselves to a tiny canon of works, probably a few hundred), distant listening is performed by a computer and can easily "listen to" thousands, if not millions, of works.[45]

So what might this kind of large-scale, full corpus, "distant listening" mean for the Shoah Foundation VHA? For one thing, it brings into stark relief the tiny fraction of memoirs and testimonies of survivors that are actually read, listened to, and taught. We tend to privilege a very small canon of witnesses, whose stories stand in—rightfully or not—for the stories of almost everyone else. We know Elie Wiesel, Anne Frank, and Primo Levi, but what about Anna Neuman-Goldman, Daniel Geslewitz, and Arie Leopold Haas?[46] Distance listening can facilitate a democ-

ratization of witnessing since it has a leveling effect in that all testimonies are granted equal importance and weight, such that no one testimony takes priority or assumes canonicity. To extrapolate structures, trends, patterns, frequencies, and correlations from the entire database will produce claims that are grounded in the experiences of exponentially more people than tend to enter into conventional historical accounts grounded in a significantly smaller sample size. I would posit that "distant reading"—or, in our case, "distant listening"—is ethical precisely because it takes into account the metadata (specifically, the keywords linked to testimony segments) of *every* survivor who had his or her story recorded in the VHA. I am not arguing that the computer should replace the human listener and the intersubjective experience at the heart of testimony, but I am saying that computational or algorithmic analysis can be ethical precisely because it takes into account the fullness of the archive insofar as all the indexed data related to the narrative of every survivor is part of the analysis.

Let me now conclude with some speculative questions with the aim of reimagining the database of the Visual History Archive in a modernist register, considering data as figuration, and implementing a practice of humanistic computing characterized by an ethics of the algorithm. We might begin by asking: How would a Levinasian database operate? What would it mean to bring the realm of the ethical as defined by Levinas as "a first philosophy" to the back-end information architecture (the database, the data structures, and the metadata standards)? In other words, I want to imagine an information architecture that is fundamentally connected to the content, and not just any content, but the specific narratives of Holocaust survivors and the listener's responsibility to that testimony through an ethics of obligation. This means the database, like all of the information architecture, is not a neutral container to store or put content into, and the goal of the information system is not simply to noiselessly and seamlessly transmit messages to receivers. Instead, the database must be conceived through the same ethical optic as watching the testimonies and, therefore, fundamentally connect testimony to the information architecture, the data ontologies, the data structures, the indexing systems, and the viewers who are engaged in a participatory mode of listening.

For Levinas, ontology is the problem because it is a philosophy rooted in being and the attempt to ground meaning though identity, objectivity,

and even certain kinds of linguistic structures, namely, what he calls the literalism of "the said." This is essentially the same literalism of the data in the VHA database: disambiguated, manifest content, objectively said. Instead of ontology, Levinas poses a philosophy of relationality, in which the self is connected to the other through bonds of responsibility, vulnerability, proximity, and even rupture. Here, the linguistic operation is the act of "saying" or, more radically, the possibility of "unsaying the said." For Levinas, the challenge is to undo the paradigms of wholeness and totality, which are implicated in philosophies that are grounded in ontology and identity, in favor of an intersubjective philosophy of relationality, alterity, fragility, and uncertainty.

I wonder how we might rethink the very genre of the database as a representational form vis-à-vis the specific experiences of bearing witness, testifying, surviving, and narrating. How might the database reflect the fragility of life, the uncertainty, ambiguity, and figuration of narrative? How might it preserve (rather than undo) the "hauntedness" that informs so much of the testimony? In other words, how might a database be open to the haunt of the past, the trace of the unknown, the spectral quality of the indeterminate, and, simultaneously, be oriented to the uncertainty of the future, the possibility of the unknown, what Jacques Derrida calls "the spectral messianicity" at the heart of the archive? Such a notion of the archive specifically disavows the finality of interpretation, relishes in ambiguity, and constantly situates and resituates knowledge through varying perspectives, indeterminacy, and differential ontologies.

As such, we might imagine how a fluid data ontology might work, by allowing multiple thesauri that recognize a range of knowledge, standards, and listening practices. For example, what if verbs that connected action and agent, experience and context were given more weight than hierarchies of nouns primarily in associative relationships? What if a more participatory architecture allowed for other listeners to create tags that could unsay the said, or in other words, undo—or, at least, supplement—the definitive indexing categories and keywords associated with the segmented testimonies? Or, more radically, what if the user interface was generated by network graphs or visualizations, such that the listener did not merely type terms into an empty search box but rather could browse the entirety of the archive in a dynamic way based on, perhaps, communities of experience, narrative structure, or even silences, gaps, and so-called nonindexical content?[47]

Such structures of saying and unsaying the database would constantly reinterpret and reinscribe the survivors' stories in ways that not only place the listener into an active relationship of responsibility but also unleash a potentiality of meaning in every act of "saying" and "browsing." Narratives would be heard in their polyphony, with some listeners hearing some things and others hearing quite different things. Through these acts of saying and unsaying, which are, according to Levinas, marked by an "allegiance" and "exposedness" to the other, the responsibility to the other might become part of the ethics of the information architecture itself. We might call it: Otherwise than the Database, or Beyond Essence.[48] In a sense, we would never be done listening, watching, and processing the testimonies because there is always more—a surplus of meaning—that is never finally captured in data or databases. And this is what the information architecture would facilitate: a hermeneutic of uncertainty, a modernist—or perhaps, Talmudic—writing and rewriting of the metadata through an ethics of obligation and ever-thicker relationships between data and narrative, as a kind of Jewish ethics of responsibility, telling and retelling, interpreting and reinterpreting, listening and being present.

There is no reason, then, why the realm of information architecture, data structures, and databases should be considered apart from the realm of ethics and the subjective, contingent, meaning-making, interpretative practices at the heart of the humanities. What is at stake when the ethical philosophies of the humanistic tradition do not fundamentally inform the digitization of the archive, when data and data management "conform to a model of mathesis that assumes objective, totalizing, mechanistic, instrumental capability"?[49] This is the risk of completely separating content from information architecture, of privileging disambiguated data ontologies over probabilistic knowledge, potentialities of figuration, and interpretative heterogeneity. But computational representation does not have to be this way if it is guided by an ethics of the algorithm.

The challenge resides in imagining a kind of humanistic computing that not only deconstructs the assumptions of mathesis operating behind and imposed on top of the cultural record but also propels an approach to information, the database, and the digital archive in general that does not seek to overcome or suppress the ambiguous, the unfinished, the differential, the multiple, and the spectral. Through ever-thicker relationships between data and narrative, saying and unsaying, visualizing and listening, it is possible for computation to facilitate an ethics of listening

that moves between the whole of the database and the individual testimony, transforming both in a never-ending, dynamic process of listening that gives rise to new narratives. As such, the ethics of the algorithm might begin by performing close and distant listening to the more than 52,000 testimonies in the Shoah Foundation archive: listening to them one by one *and* by listening to them all at once.