

Goals of early hypertext systems. Basic hypermedia concepts.

CS 183 – Hypermedia and the Web – Lecture Notes

The notion of a singular document relating to other documents is ancient.

- Religious texts across cultures have included and attracted annotations, texts providing discussion and commentary on holy scriptures.
- Roman jurists referenced other legal decisions and precedents precisely, though other Roman authors only rarely referenced the authors, and less frequently the titles, of works on which they based their texts. More typically they quoted passages from memory, often introducing a slight change to show this.
- Later, in the 12th century schools that evolved into universities, medieval scholars developed precise and standardized reference forms.
- The modern footnote, distinct from annotation and citation, can be traced back to at least 1696, and the publication of “Historical and Critical Dictionary” by Pierre Bayle, an ambitious volume that sought to document all errors and omissions in existing historical reference books.
- By the middle of the 20th century, the practice of documents containing footnotes, as well as annotating and citing other documents, was common in most branches of academia.

Goals of early hypertext systems

Vannevar Bush, July 1945 Atlantic Monthly article, “As We May Think”

Bush: during WWII, the Director of the Office of Scientific Research and Development, coordinated scientists working on problems associated with war effort

“The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important items is the same as was used in the days of square-rigged ships.”

- concerned with the problem of categorizing knowledge
- to find a piece of knowledge, need to track it down from category to sub-category, then repeat the process to find another piece of information

“The human mind does not work that way. It operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain. ... Selection by association, rather than by indexing, may yet be mechanized.”

Introduced a device, called the “memex”:

- desk, with multiple viewing screens, a keyboard, and sets of buttons and levers
- permits viewing of publications stored on microfilm
- can retrieve contents using a mnemonic code
- supports linking two publications together
- also permits joining publications together into a trail

“The owner of the memex, let us say, is interested in the origin and properties of the bow and arrow. Specifically he is studying why the short Turkish bow was apparently superior to the English long box in the skirmishes of the Crusades. He has dozens of possibly pertinent books and articles in his memex. First he runs through an encyclopedia, finds an interesting but sketchy article, leaves it projected. Next, in a history, he finds another pertinent item, and ties the two together. Thus he goes, building a trail of many items. Occasionally he inserts a comment of his own, either linking it into the main trail or joining it by a side trail to a particular item. When it becomes evident that the elastic properties of available materials had a great deal to do with the bow, he branches off on a side trail which takes him through textbooks on elasticity and tables of physical constants. He inserts a page of longhand analysis of his own. Thus he builds a trail of his interest through the maze of materials available to him.”

The memex was never built.

Vannevar Bush made the critical leap that inter-document relationships could be *mechanized*.

Later researchers immediately saw that the computer was the obvious technology to use to achieve the vision of memex.

Bush’s ideas attracted the attention of two people, Doug Engelbart, and Ted Nelson.

Doug Engelbart: NLS/Augment

1962:

Goal is to augment human intellect.

“By “augmenting human intellect” we mean increasing the capability of a man to approach a complex problem situation, to gain comprehension to suit his particular needs, and to derive solutions to problems. Increased capability in this respect is taken to mean a mixture of the following: more-rapid comprehension, better comprehension, the possibility of gaining a useful degree of comprehension in a situation that previously was too complex, speedier solutions, better solutions, and the possibility of finding solutions to problems that before seemed insoluble.”

“Man’s population and gross product are increasing at a considerable rate, but the complexity of his problems grows still faster, and the urgency with which solutions must be found becomes steadily greater in response to the increased rate of activity and the increasingly global nature of that activity. Augmenting man’s intellect, in the sense defined above, would warrant full pursuit by an enlightened society if there could be shown a reasonable approach and some plausible benefits.”

Engelbart’s research team at SRI developed a system called NLS, which was demoed at the 1968 Fall Joint Computer Conference. It was the first public demonstration of:

- the mouse
- hypermedia linking
- on-screen video conferencing

NLS also contained advanced text editing capabilities (word processing), and email handling. It was an early node connected to the Arpanet (predecessor of the Internet).

At Brown University, in 1967, Andy van Dam worked with Ted Nelson to create HES. Van Dam then worked on the FRESS system. Features:

- It allowed massive on-screen editing.
- It allowed a typed string to be as long as the user wants it to be.
- It allowed links within a document, leading to other parts of the document or another document altogether.

Ted Nelson, Xanadu

“To be able to read, on computer screens, from vast libraries easily, the things we choose being clearly and instantly available to us, in a great interconnected web of writings and ideas.” Literary Machines 1/2

Goals for Xanadu:

- Represent associations among documents, and navigate them with unbreakable links
- Easily intercompare documents, and versions of documents, with side-by-side comparison
- Support writing by the easy composition of new and pre-existing chunks of text
- Work with the existing copyright system to reward authors of documents
- Be able to reuse chunks of text from other documents by including them within new documents (transclusion concept)
- A large, globally distributed collection of documents

Several prototypes constructed, but never completed or fielded.

Basic Hypermedia Concepts

Ted Nelson coined the term hypertext.

Coined in the mid-1960's by Ted Nelson, the term *hypertext* conjoins *hyper* and *text*.

As defined by Nelson: hypertext is non-sequential writing

Hyper, used as a prefix, derives from the Greek *hypér*, originally meaning over, or above, but whose meaning typically implies excess or exaggeration. A synonymous prefix is *super*.

There is also the independent meaning of *hyper* used as a noun to mean, “a person who promotes or publicizes events, people, etc., esp. one who uses flamboyant or questionable methods; promoter; publicist”.

Text has the original meaning of words woven together, and so combined with hyper, hypertext implies both a super text, a text that, due to interlinking, is greater than the original texts, and a super weaving of words, creating new texts from old.

Given the struggle Nelson encountered in disseminating the idea of hypertext, it is possible to view the word hypertext acting as a promoter and publicist, carrier of the linked text meme. Nelson writes:

I coined the term “hypertext” over twenty years ago, and in the ensuing decades have given many speeches and written numerous articles preaching the hypertext revolution: telling people hypertext would be the wave of the future, the next stage of civilization, the next stage of literature and a clarifying force in education and the technical fields, as well as art and culture. *Literary Machines*, p. 0/2

In fact, the flamboyant promotion of hypertext was such an integral part of the initial culture of the hypertext community that by 1987 Jeff Raskin’s paper at the Hypertext’87 conference is titled, “The Hype in Hypertext: A Critique” where he claims Nelson, “writes with the messianic verve characteristic of visionaries,” and in 1989 Norm Meyrowitz’s Hypertext’89 conference keynote is titled, “Hypertext—Does It Reduce Cholesterol, Too?”. Clearly the notion of the interlinked text as super text is inseparable from hypertext as hyped concept.

A node, or object, is a chunk of data that can be stored as a file, a database record, or even, as is the case with Web pages in embedded devices, a sequence of read-only memory. Dynamic objects can be arbitrary computational processes, a common occurrence on the Web.

Relationships between objects are called hypertext links. Though the detailed specifics of links vary across systems, in general a hypertext link associates two or more objects, providing a means to navigate quickly between them.

Links can be either to entire objects, or to a specific region, called an anchor, within an object.

At their most abstract, anchors and links can both be arbitrary computational processes, one example being an automatic link between any word in a document, and its entry in a dictionary.