Twenty Problems
of
Information Technology

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September 25, 2001

Problem 1

Taking a glance at the 3 billion pages of the Web. It is not just the huge number of pages that is the problem, but also the disorganized state of the Web.

Problem 2

Isolating a few thousand pages of the Web, which are worth looking at. The technology for clearly spelling out the content of a page is only just developing.

Problem 3

Analyzing 3 billion base pairs in the human DNA. Having a sequence of letters is certainly not useful, unless we have some idea of the language used.

Problem 4

Isolating the estimated 30 thousand human genes from the DNA sequence. The importance of this is obvious, since the genes decide the physical and mental characteristics of human beings.

Problem 5

Understanding the functions of all the human genes. Functions of more than half the discovered genes remain unknown.

Problem 6

Making 6 billion people literate and providing at least an elementary education. In the world today, it is even more important to be technically literate.

Problem 7

Designing e-learning management systems for the Web to ease the burden of tutoring 6 billion people.

Problem 8

Looking at the individual atoms of the protein molecule to learn about the mechanism of protein folding.

Problem 9

Peer-to-peer computing, to ease the computational complexity of problems like protein folding.

Problem 10

Developing database management systems that can deal with the ter-
abyte databases that are mushrooming on the Web.

Problem 11

Developing a theory of search engines to make a judgment on the quality of 3 billion Web pages.

Problem 12

Developing standards for the metadata in Web pages to provide more clarity for the content.

Problem 13

Using the vast resources of the Internet for social functions like voting, so that election results will not be left dangling.

Developing a theory of voting to circumvent inherent problems like Arrow's paradox. The paradox says that democracies are not possible with the current voting systems.

Problem 15

Developing exemplary core courses for higher education so that the same courses can be taught around the world through the Web.

Problem 16

Developing an exemplary course management system and making it free so that the delivery of courses will be uniform throughout the world.

Problem 17

Developing a comprehensive course archives network for the free use of the Web community, so that all courses can be accessed anytime anywhere using a common course management system.

Problem 18

Developing wireless communications software so that the mobile computer can transform itself into a home computer or office computer. Note that there is commercial software available which will transform a home computer into an office computer or vice versa.

Publishing mathematics on the Web. Even though there has been attempts to enhance HTML to make it suitable for mathematics, the real choice we have is only the TeX typesetting. Note that it is possible to have hyper referencing in TeX.

Problem 20

A familiar but unemphasized fact is that string manipulation of the four Maxwell's equations is what allowed us to predict electromagnetic waves. From this we can surmise that proper use of language can be a powerful tool to gain information and knowledge about nature. A derivation in mathematical logic in nothing but a step by step procedure to gain information about the subject matter until we arrive at certainties. Thus, linguistics, metamathematics, and information theory are all inextricably intertwined. It follows that information technology can greatly benefit by the study of these subjects.

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