The NCGIA Core Curriculum in GIScience
Introduction

Contents

Related documents

Outline—complete list of all units, organized by thematic sections and collected into 4 volumes. Includes unit key numbers used to catalog individual units.

For historical context, the following material outlines the plans for the GISCC as of 1998 and provides an update for those interested in subsequent developments through NCGIA and its UCSB affiliate—the Center for Spatially Integrated Social Science. The inclusion of NCGIA's core curricular resources within eScholarship is a 2015 initiative by the UCSB Center for Spatial Studies.

About the GISCC (ca. 1998)

Introduction

Given the continuing demand for copies of the original 1990 NCGIA Core Curriculum in GIS, the NCGIA has decided that a major revision is warranted. While we initially felt that widespread diffusion of these lecture materials would eventually make our document redundant, it is apparent that the continued rapid development of the technology and the awakening of the concept of geographic information science continues to make such materials of value.

In light of the technological changes over the last six years, it is clear that a new Core Curriculum must exist on the WWW. Using the WWW as the main distribution channel has many advantages, including ease of revision, reduction of physical distribution demands and the provision of a direct means for referencing related resources on-line.

In our new GIS Core Curriculum project, we are reviving some of the most successful aspects of the original project. In particular, we are encouraging the full participation of the international GIS education community. However, the new Core Curriculum project is based on a completely revised outline which takes into consideration the many changes and advances during the past 8 years.

Design philosophy

In keeping with the spirit and success of the original Core Curriculum and to meet the same specific need in the GIS education materials market, the new Core Curriculum will concentrate solely on providing fundamental course content *assistance* for *educators* - formally as lecture materials, but adaptable for whatever instructional mode each course instructor wishes to use. Thus, as before, we are not interested in compiling a comprehensive textbook for students, but rather, lecture note outlines similar in structure and content to those used originally. As a "core" curriculum, it is not intended to impose any specific structure or educational objectives. Nor does it imply any required content for GIS courses. Instructors will be encouraged to pick and choose amongst the materials on offer in order to develop courses suited specifically for their own students. Course design remains the responsibility of individual instructors.

Organizing the core concepts of GIS into a number of small, self-contained units based on a one-hour lecture format provides both an organizing framework and flexibility for instructors using the materials in their individual course preparation. By placing the materials on-line, the potential exists for subsidiary project teams to develop supporting structures (e.g., hypertext) which organize the lecture notes and other on-line materials into interactive tutorial systems.

Organization of the core concepts

The proposed framework of the curriculum is based on a simple principle—that the characteristic distinguishing GIS and geographic information technologies in general from all other fields is a focus on geographic concepts. These are defined as the primitive elements, features, and relationships used to analyze, model, reason and make decisions in a geographic context. They range from concepts about the form of the Earth and the measurement of position on its surface, to concepts of direction, adjacency, and connectivity, to the more advanced concepts that underlie our understanding of the processes that operate on the Earth's surface. Geographic knowledge is constructed from geographic concepts, and these concepts form the basis for people's conceptual understanding of the world around them. Geographic concepts range from the simplest primitives of geographic cognition learned in early childhood to the far more advanced structures used in the modeling of

environmental and social processes.

The curriculum is organized as a tree, with geographic concepts at the bottom or root node. Above this are four major branches: the branch that deals with the concepts themselves, enumerates them, and describes their role in human cognition; the branch that discusses the implementation and handling of geographic concepts in digital computers; the branch that examines the management of these technologies, their implications for society, and the social context in which they are being used; and finally, a branch which critically examines how GIS is used in various applications. The four main branches are titled "Fundamental Geographic Concepts for GIS"; "Implementing Geographic Concepts in GIS"; "Geographic Information Technology in Society"; and "Application Areas and Case Studies".

Above each of these branch nodes are further subtrees terminating in individual instructional units or leaf nodes. The atomic unit provides notes on which an instructor can base a 50 minute class. It consists of about 7 pages of point-form text, with inline sketches and graphics. The notes provide a structure within which the instructor can add anecdote, examples and additional material to flesh out the framework, make it more interesting and add to its pedagogic value.

By using a tree structure, the curriculum avoids linearity, and allows complexity to be added. The number of levels of the tree is not defined; new units can be added above existing ones, to add greater detail, but must be appropriately linked to the parent. If an instructor opted to traverse the entire curriculum, it could be done in any combination of height and breadth - height-first traversal would produce a linear and highly specialized course structure, while breadth-first traversal would place all of the introductory material first.

At best, the community as a whole will likely agree only on the lower levels of the tree. The proposed editorial procedure is designed to allow as much freedom as possible in the upper more detailed levels, so that units can be contributed on specialized topics with minimal need for restructuring. The only requirement is that they fit the template for the individual instructional unit, and fit somewhere above a parent node. If a parent node does not exist, the editorial committee will need to consider whether it should be generated so as to provide an appropriate home for the proposed child.

Editorial procedure

The editorial procedure has recently undergone major revision. The original intent was to establish a peer reviewed context as a means of recognizing the contributions made by our authors. An Editorial Board and several Section Editors were identified to oversee a formal review process. However, it seems we were unsuccessful at selling the value of contribution to this project as a peer reviewed exercise, so in an effort to get the project done, a more streamlined process of internal review with public comment following posting is now being used.

Development timetable

- Nov '95
  - initiate discussion and review of outline and editorial structure
- Apr-June '96
  - recruit editorial board and committee
  - identify potential authors
  - prepare unit template and construct WWW structure
- beginning late-1996
  - recruit authors
  - assign authors to units
- beginning mid-1997
  - drafts submitted by authors to editors
  - peer review
  - revision of units
  - post to public web
  - site on-line review begins
- mid-1998
  - units at various stages of assignment, development, review and final editing
- fall 1998
  - revise editorial procedure, reduce number of units to be written

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Original Developers of the NCGIA Core Curriculum in GIScience

as of October, 1998

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- Nancy von Meyer, Fairview Industries

Update News—August 2000 from the GISCC Editor:

As many of you have observed, the GISCC went into a state of suspended animation on December 28, 1998. Many new projects are changing the face of GIS education (see for example the Digital Library for Earth System Education (DLESE), the Instructional Management System or the ESRI Virtual Campus). While the technological context for the GISCC is changing dramatically and the access to materials rapidly increasing, there continues to be community interest in having resources such as the GISCC readily and freely available. NCGIA continues to support the development and maintenance of the GISCC.

With new funding for the Center for Spatially Integrated Social Science (CSISS), NCGIA plans to develop new sections on spatial analysis and related topics. Watch for changes in the coming year! Karen Kemp, senior editor, GISCC, August 13, 2000.

Update—October 2015 for the eScholarship NCGIA archive:

The Center for Spatially Integrated Social Science was established with NSF funding in October 1999 with the objective to provide national research infrastructure in support of spatial analysis in the social sciences. The CSISS website provided access to NCGIA core curricular resources and created additional resources focused on applications of spatial analysis across social science disciplines. In this context, its attention was directed to extensive training programs and spatial econometric software development. Special efforts were directed to supporting communities of interest in spatial thinking within disciplines, some of which were in their early phases of using geographical technologies. This included 36 weeklong residential workshops in GIS, spatial econometrics, cartographic visualization, remote sensing, agent modeling, and spatial demographics. In addition, 11 weeklong workshops focused on the introduction of spatial thinking for undergraduate social science courses. These programs attracted more than 1,100 participants over the period June 2000 and August 2011. Documentation of CSISS programs are featured at http://csiss.org and http://gispopsci.org and within the CSISS Archive at http://escholarship.org/uc/spatial_ucsb_csiss.

Inclusion of the core curricula resources by NCGIA in the eScholarship archive has been a priority initiative of UCSB's Center for Spatial Studies in 2015, a project carried out by Kitty Currier and Donald Janelle.