CSCI 599
Geospatial Data Integration
Spring 2011

Instructors: Craig Knoblock (knoblock@isi.edu) and Yao-Yi Chiang (yaoyichi@isi.edu)

Meeting Time: Tuesdays 3:30-6:20pm

Location: THH 217

Office Hours:
Professor Knoblock
- Tuesday 6:20-6:50pm (THH 217, if available)
- Friday 1:30-2pm (ISI 922 or by phone: 310-448-8786)
- Or by appointment
  - On campus Tuesdays 2:45-3:15pm
  - At ISI or by phone: 310-448-8786 other times

Course Web Page: USC Blackboard (blackboard.usc.edu)

There is an ever-increasing amount of geospatial data available, including satellite imagery, aerial imagery, maps, vector layers, elevation data, photos, etc.. There is also a huge amount of information that can be linked to location and integrated with the geospatial layers. This course will focus on the problem of how to integrate the diverse sources of geospatial data. The course will cover a wide variety of topics within this area, including building geospatial mashups, geospatial source discovery, geospatial mediation, geospatial semantic web, geocoding, registering and aligning geospatial layers, extracting layers from maps, linking documents to locations, integrating data for the mobile phone, and open-source GIS systems.

The class will be run as a lecture course with lots student participation, student presentations, and hands-on experience. The class will cover the latest research papers, software, tools, and results on the various topics. Each student will present a research paper in class and develop and build a geospatial data integration project based on the research and tools covered in the class.

Prerequisites: None

Recommended Courses:
  CSC1561 -- Introduction to AI
  CSC1585 – Database Systems
CSCI587—Geospatial Information Management

**Grading:**
- Course project -- 35%
- Quizzes – 25%
- Homeworks – 20%
- Class Presentation/Participation – 20%

**Books:** There is no required textbook. We will read technical papers on each topic.

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**Course Syllabus and Schedule**

- **January 11**
  - **Topic:** Introduction and Geospatial Basics (Professor Knoblock)
  - **Readings:**

- **January 18**
  - **Topic:** Geographic Information Systems: ArcGIS (Dr. Chiang)
  - **Readings:**
    - Paper
    - Paper

- **January 25**
  - **Topic:** Building Geospatial Mashups (Professor Knoblock)
  - **Readings:**
    - Making Mashups with Marmite: Towards End-User Programming for the Web
    - Paper
    - Intel Mashmaker
    - Paper
    - Paper
    - Building geospatial mashups to visualize information for crisis

Paper

- Suggested Readings:
    Paper
    Paper

- February 1
  - **Topic: Geographic Information Systems (Dr. Chiang)**
  - **Readings:**
    Paper
    Paper
  - **Suggested Readings:**
    Paper
  - **Using geographic information system analyses to monitor large-scale distribution of nicotine replacement therapy in New York City**, Karen Davis Czarneckia, Chris Goransonb, Jennifer A. Ellisa, Laura E. Vichinsky, Micaela H. Coadya, and Sarah B. Perla, Preventive Medicine, Volume 50, Issues 5-6, May-June 2010, Pages 288-296
    Paper
• February 8
  o Topic: Geospatial Semantic Web (Professor Knoblock)
  o Readings:
    ▪ The Semantic Web in Breath by Aaron Swartz
      Paper
    ▪ The Semantic Web: An Introduction
      Paper
    ▪ The Geospatial Semantic Web by Frederico Fonseca
      Paper (Follow the “Open URL”, Read pages 367-376 in NetLibrary)
    ▪ Toward the Semantic Geospatial Web by Max J. Egenhofer
      Paper
  o Suggested Readings:
    ▪ Geospatial Semantics: Why, of What, and How?
      Paper
    ▪ Exploring the Geospatial Semantic Web with DBpedia Mobile
      Paper

• February 15
  o Topic: Mapping Addresses to Locations (Geocoding) (Professor Goldberg)
  o Readings:
    ▪ Exploiting Online Sources to Accurately Geocode Addresses.
      F. Cruz, and M. Ronthaler (Eds.), ACM-GIS ’04: Proceedings of
      the 12th ACM International Symposium on Advances in
      Geographic Information Systems, Washington DC, USA,
      Paper
    ▪ Improving geocode accuracy with candidate selection criteria.
      Goldberg, D. W., Cockburn, M. G. (2010). Transactions in GIS.
      Vol. 14 (S1), pp. 129-146.
      Paper
    ▪ Toward Quantitative Geocode Accuracy Metrics. Goldberg, D.
      Ninth International Symposium on Spatial Accuracy Assessment
      in Natural Resources and Environmental Sciences. pp. 329-332
      Leicester, UK.
      Paper
    ▪ From text to geographic coordinates: The current state of
      geocoding. Journal of the Urban and Regional Information
      Systems Association. Goldberg, D. W., Knoblock, C. A., Wilson,
      Paper
  o Suggested Readings:
Paper

A Flexible Addressing System for Approximate Geocoding, Davis et al.
Paper

February 22
- Topic: Linking Text Documents to Location (Professor Knoblock)
- Readings:
  Paper
  Paper
  Paper

- Suggested Readings:
  Paper
  Paper
  Paper

March 1
- Topic: Integrating data for mobile phones (location-based services) (Dr. Chiang)
- Readings:
  Paper
• Location-Based Services for Mobile Telephony: a Study of Users’ Privacy Concerns, Louise Barkuus, and Anind Dey, Proceedings of the INTERACT 2003, 9th IFIP TC13 International Conference on Human-Computer Interaction
  Paper
  Paper

  o Suggested Readings:
    Paper
    Paper

• March 8
  o Topic: Geospatial Reasoning and Fusion (Professor Knoblock)
  o Readings:
    Paper
    Paper
    Paper
  o Suggested Readings:
- **Information Fusion for Feature Extraction and the Development of Geospatial Information.** Michael A. O’Brien and John M. Irvine
  [Paper](#)

- **Merging of Heterogeneous Data for Emergency Mapping: Data Integration or Data Fusion.** Florin Savopol and Costas Armenakis
  [Paper](#)

- **March 14-18**
  o **Spring Break!**

- **March 22**
  o **Topic:** Registering and Aligning Geospatial Layers (Dr. Chiang)
  o **Readings:**
      [Paper](#)
      [Paper](#)
      [Paper](#)
  o **Suggested Readings:**
    - **Design of a conceptual framework and approaches for geo-object data conflation,** Li, Linna, Ph.D., UNIVERSITY OF CALIFORNIA, SANTA BARBARA, Chapter 2: Geo-Object Data Conflation: Review and Overview
      [Thesis](#)
      [Paper](#)

- **March 29**
  o **Topic:** Building 3D Models from LIDAR (Professor Neumann)
  o **Readings:**
    - **2.5D Dual Contouring: A Robust Approach to Creating Building Models from Aerial LiDAR Point Clouds,** Q. Zhou and U. Neumann, In proceeding of 11th European Conference on Computer Vision (ECCV), Greece, September 5-11, 2010 (Oral Paper)
      [Paper](#)
    - **A Robust Approach for Automatic Registration of Aerial Images**

Paper


Paper

- Suggested Readings:

  Paper

  Paper

• April 5
  - Topic: Extracting Layers from Maps (Dr. Chiang)
  - Readings:
    - Harvesting Geographic Features from Heterogeneous Raster Maps, Y.-Y. Chiang, Ph.D. Thesis, Department of Computer Science, University of Southern California. Chapter 2, pages 12-57

    Thesis

    Paper

    Paper

  - Suggested Readings:

    Paper

    Paper

• April 12
o Topic: Geospatial Source Discovery (Professor Knoblock)
Readings:
    Paper
    Paper
  ▪ A Data Integration Approach to Dynamically Fusing Geospatial Sources. Thakkar, S. Ph.D. Thesis, Department of Computer Science, University of Southern California. Chapter 3, pages 42-80
    Thesis
  o Suggested Readings:
      Paper

• April 19
  o Project Presentations

• April 26
  o Project Presentations

Statement for Students with Disabilities
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. Scampus, the Student Guidebook, contains the
Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.