

Curriculum Vitae

Liping Yang BSc MSc PhD

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Academic Positions

Fall 2016 – present:

Postdoctoral Researcher
GeoVISTA Center, Department of Geography and Institute for CyberScience
Pennsylvania State University

June 2017 – July 2017:

Visiting Scholar
CISL (Computational Information Systems Laboratory), Mesa Lab
NCAR (National Center for Atmospheric Research)

Fall 2015 – Summer 2016:

Postdoctoral Research Assistant
School of Computing and Information Science
University of Maine

Education

2010—2015	University of Maine, USA
2006—2009	Fujian Normal University, China
2002—2006	Yunnan Normal University, China

Qualifications

2015	PhD	University of Maine, USA	Spatial Information Science and Engineering
2009	MSc	Fujian Normal University, China	Cartography and GIS
2006	BSc	Yunnan Normal University, China	GIS

Research Interests

GIScience; computational algorithms; machine/deep learning; visual analytics; big (geospatial) data; image and point cloud processing; ontologies; indoor spaces and indoor navigation

Research and Project Experience

1. Fall 2016 – present Working with Prof. Alan MacEachren and Prof. Guido Cervone.
 - Coordinating the Penn State ICS seed grant awarded to Prof. Alan MacEachren.
 - Communication with domain experts for domain problem characterization (i.e., requirement analysis);
 - Communication with the whole research team (a team of 8 people) and also the implementation sub-team for data structure/operation abstract design and interaction technique design;
 - My main implementation contributions: deep learning for text classification using Google TensorFlow and Keras; active deep learning based Visual Analytics interface design and development for text data using Node.js, Bootstrap, D3.js, and Django web framework; multi-GPU-enabled computing.
 - Weather prediction using deep learning (collaboration with Prof. Guido Cervone at Penn State and Dr. Davide Del Vento at NCAR Mesa lab).
 - With Python and under Linux environment;
 - Implementation based on TensorFlow and Keras;
 - GPU-enabled HPC computing.
 - Topic modeling, sentiment analysis, and text classification using machine learning and deep learning techniques.
 - With Python and under Linux environment;
 - Implementation based on TensorFlow, Keras, Scikit-learn, Gensim, and NLTK;
 - GPU-enabled computing.
 - Fusion of remote sensing and social media during emergencies – with an emphasis on image classification using machine learning and deep learning techniques.
 - With Python and under Linux environment;
 - Development based on TensorFlow, Keras, and Scikit-learn;
 - GPU-enabled computing;
 - Parallel computing using Spark, OpenMP, and MPI.
2. Fall 2015 – Summer 2016 Perception of indoor scene layouts by machines and visually impaired users (NSF grant), directed by Prof. Kate Beard. Working as a postdoctoral research assistant.
 - Modular ontologies for indoor scene understanding;

- Image processing, including color and depth images;
 - Point cloud processing;
 - with C++ and under Linux environment;
 - Using Kinect for data capture.
3. 2010 – 2015 Information integration and human interaction for indoor and outdoor spaces (NSF grant), directed by Prof. Michael Worboys. Working as a graduate research assistant.
- Developed four levels of ontologies based on affordance and modularization: Upper ontology, structure ontologies of outdoor and indoor spaces, navigation task ontology, and application ontology.
 - Extended and proposed two formal spatial concepts: *Extended combinatorial maps*, in order to apply combinatorial maps to indoor space navigation, and *dual map*, in order to very quickly calculate the dual graph of the structure graph representing a floor from the combinatorial map.
 - Developed and implemented in Java several computational algorithms of formal spatial models that can be used in the context of indoor space navigation, including computing extended combinatorial maps, dual maps, a maptree, and the dual graph of a maptree.
 - Proposed a new concept that allows localization of kernels of a polygon, and termed it *local kernel* and implemented in Java.
 - Proposed an approach to (almost fully) automatic generation of navigation graphs for indoor spaces, using formal spatial models and combining semantic and geometric considerations. Implemented in Java a case study of a university building floor to demonstrate the approach.
4. 2007 – 2009 Eco-environmental dynamic monitoring and management system of Fujian Province, directed by Prof. Ke Liao at Fujian Normal University.
- Designed and created an eco-environment database;
 - Designed spatial analysis components.
5. 2006 – 2009 An event-based deductive spatio-temporal data model and its reasoning mechanism (National Natural Science Foundation of China), directed by Associate Prof. Guangfa Lin at Fujian Normal University.
- Integrated textual files;
 - Extracted events;
 - Implemented auto-match between text and map based on ESRI's ArcObjects.
6. 2006 – 2008 Estimation and evaluation of ecological assets of Xiamen City based on RS and GIS, directed by Associate Prof. Guangfa Lin at Fujian Normal University.
- Remote sensing image processing, including georeferencing, ortho-rectification, resolution merge (multi-spectral and pan image layers), and image mosaic of SPOT 5 images;

- Interpreted LUCC data from georeferenced SPOT 5 images according to field surveying in Xiamen city;
 - Designed and created remote sensing and thematic maps.
7. 2006 – 2007 Research on the spatial pattern and ecological process of Hani terraced field landscape and its protection in Ailao mountain (National Natural Science Foundation of China), directed by Associate Prof. Yuanmei Jiao at Yunnan Normal University.
- Georeferenced scanned contour maps and QuickBird RS images;
 - Vectorized contour lines from the rectified contour maps and terraces from georeferenced QuickBird images;
 - Computed fractal information index, including box-counting dimension and information dimension, with GIS analysis methods. Wrote C code to automate data processing.
8. 2005 summer Internship at Kunming geotechnical investigation and surveying research institute.
- Surveyed and created topographic maps with a scale of 1:500 in fields using GPS equipment;
 - Post-processed the map data with software package MicroStation.

Teaching and Mentoring Experience

- Fall 2017 Co-teaching GEOG 461W (Dynamic Cartographic Representation) with Prof. Alan M. MacEachren, Department of Geography, Pennsylvania State University, USA.
 - Develop course syllabus together with Prof. MacEachren.
 - Instruct programming for web development and design using HTML, CSS, and JavaScript, including Leaflet.js, D3.js, jQuery, and AJAX etc.
 - Prepare lab instructions and lab quizzes.
 - Lead course discussions and give lectures on user-centered design when Prof. MacEachren was out of town.
 - Develop extra lab materials and readings for the course on my blog.
 - Guide students' final interactive web map app projects (including instructing students using Git and Bitbucket for version control and collaboration).
- May 2017 – July 2017 Department of Geography and Institute for CyberScience, Pennsylvania State University, USA. Assist Prof. Alan MacEachren in mentoring his summer RA PhD student for awarded Penn State ICS seed grant project. Meet frequently with the student to setup Linux and Java programming environment, discuss about research tasks related to natural language processing (NLP) and problems she met.
- Nov. 2016 – May 2017 Department of Geography and Institute for CyberScience, Pennsylvania State University, USA. Assist Prof. Guido Cervone in mentoring his visiting PhD student from Peking University. Meet weekly with the student to discuss about his PhD

research, paper writing, and programming using machine learning and deep learning techniques.

- Aug. 2011 – Dec. 2011 and Sept. 2012 – Dec. 2012 School of Computing and Information Science, University of Maine, USA. Assisted my advisor Prof. Michael Worboys in his course, “Formal Foundations for Information Science.” Set up online teaching environment Adobe Connect Pro. Helped the students with LaTeX required for the course. Gave review and problem solving lectures while Prof. Worboys was out of town.
- Jun. 2011 – Aug. 2011 School of Computing and Information Science, University of Maine, USA. Assisted Prof. Worboys in guiding his summer intern undergraduate student from France. Helped her set up Java and ArcGIS programming environments, and met weekly with her to discuss and provided suggestions to the problems she met.
- Jun. 2007 – Jun. 2010 College of Geographical Sciences, Fujian Normal University, China. Assisted my advisor Prof. Guangfa Lin in guiding senior undergraduates. Guided the students for field surveying and their thesis research and writing.
- Mar. 2007 – Jul. 2007 College of Geographical Sciences, Fujian Normal University, China. Assisted my advisor Prof. Lin in his course, “Spatial Analysis” for GIS junior undergraduates. Ran course labs and provided suggestions to students’ questions related to the course and labs.

Publications

Refereed research papers

(A few papers integrating GIScience, RS, Visual Analytics, and Machine/Deep Learning, which have been led by Liping Yang, are on the way.)

1. **Yang, L.** and Worboys, M. Generation of navigation graphs for indoor space. *International Journal of Geographical Information Science*, 29(10): 1737-1756, 2015.
2. **Yang, L.** and Worboys, M. A navigation ontology for outdoor-indoor space. *Third ACM SIGSPATIAL International Workshop on Indoor Spatial Awareness (ISA 2011)*, November, Chicago, IL. 2011.
3. Ma, J., Lin, G., Chen, J. and **Yang, L.** An improved topographic wetness index considering topographic position. *Geoinformatics, 18th International Conference*. IEEE, 2010.
4. Lin, L., Lin, G., Yan, X., **Yang, L.**, Yang, Z. and Chen, A. Surface modeling of human population on subdistrict scale using SPOT5 image and census data: A case study of Xiamen, PR China. *Geoinformatics, 18th International Conference*. IEEE, 2010.
5. **Yang, L.**, Lin, G., Chen, A., Chen, Y., and Wen, X. A spatio-temporal data model for administrative division place names: A case study of Xiamen. *Proceedings of the 6th International Symposium on Digital Earth (ISDE6): Digital Earth in Action*, Organized by

International Society for Digital Earth (ISDE) and Chinese Academy of Sciences(CAS), Beijing, P. R. China, September 9-12, 2009.

6. **Yang, L.**, Lin, G. and Chen, Y. Color processing methods of different seasonal SPOT5 images before mosaic. *Remote Sensing Technology and Application*, 24(2): 140-145, 2009. (in Chinese)
7. You, L., Lin, G., Yang, C., Lin, Q. and **Yang, L.** The effects of spatial scales on landscape indices – a case study of the landuse pattern of Xiamen island. *Geo-Information Science*, 10(1): 74-79, 2008. (in Chinese)
8. Jiao, Y. and **Yang, L.** Multi-scale research on the fractal beauty of Hani terrace based on remote sensing and geographic information system. *Journal of Mountain Science*, 26(3): 339-346, 2008. (in Chinese)
9. Jiao, Y. and **Yang, L.** The fractal characteristics of Hani terrace in Ailao mountain. *Acta Ecologica Sinica*, 27(11): 4583-4589, 2007. (in Chinese)

Invited talks and papers and posters presented at conferences and seminars (not included above)

Introduction to Deep Learning with TensorFlow (with hands-on tutorial: using TensorFlow for image classification on NCAR HPC cluster), invited talk, *NCAR SEA Class and Hands-on Workshop: Spark and TensorFlow*, NCAR (National Center for Atmospheric Research), Boulder, CO. June 2017.

What is Deep Learning, invited talk, *the Geospatial Data Science Workshop (GDS 2017)* at Pennsylvania State University, University Park, PA. February 2017.

A unified OI-space navigation model supporting seamless navigation between and within built indoor and outdoor spaces. Doctoral colloquium talk at *the Conference on Spatial Information Theory (COSIT 2013)*, September, Scarborough, UK. 2013.

A navigation ontology for outdoor-indoor space. *Poster presentation at the UMaine Graduate Expo*, April 2012, University of Maine.

Similarities and differences between outdoor and indoor space from the perspective of navigation. *Poster presentation at the Conference on Spatial Information Theory (COSIT 2011)*, September, Belfast, ME. 2011.

A unified informatic framework supporting seamless navigation within built indoor and outdoor spaces. Doctoral colloquium talk at *the Conference on Spatial Information Theory (COSIT 2011)*, September, Belfast, ME. 2011.

Theses

Theories and models of indoor space, PhD Thesis, University of Maine, 2015.

Auto-match between text and map based on Chinese word segmentation: A case study of land use policy text, MSc Thesis, Fujian Normal University, 2009.

Design and development of transport information system based on MapObjects: A case of Kunming City, BSc Thesis, Yunnan Normal University, 2006.

Honors and Awards

2014 – 2015 Michael J. Eckardt Dissertation Fellowship in MEIF (Maine Economic Improvement Fund) Areas, University of Maine, USA

2010 – 2014 Graduate Research Assistantship, University of Maine, USA

2011 ACM SIGSPATIAL GIS 2011 NSF Student Travel Grants, USA

2010 ACM SIGSPATIAL GIS 2010 NSF Student Travel Grants, USA

2005 Yunnan Province Government Scholarship (Top level), China

2004 National Scholarship (Top level), China

Research Grants (externally funded)

Experiments with TensorFlow and Apache Spark on Cheyenne and Yellowstone Supercomputers for Image Classification and Segmentation, **Liping Yang (PI)**, Guido Cervone (CoPI), 2017 NCAR/CISL summer research grant, June 2017 – July 2017.

Weather prediction using deep learning. **Liping Yang (PI)**, Guido Cervone (CoPI), Davide Del Vento (CoPI), April 2017 – April 2018. (Awarded NCAR/CISL computing allocation resources: Geyser & Caldera (Data Analysis and Visualization clusters): **5,000.0 Core-hours**; CMIP Analysis Platform: 1.0 [Yes = 1, No = 0]; HPSS Storage System: **5.0 TB**; Cheyenne (SGI ICE XA Cluster): **50,000.0 Core-hours**)

2017 NVIDIA GPU Grant Proposal, **Liping Yang (PI)**, Guido Cervone (CoPI), Alan MacEachren (CoPI), NVIDIA awarded one Titan X Pascal GPU card, May 2017.

Research Grants (internally funded)

Comment Analytics: Leveraging Big Unstructured Data to Understand Spatial and Temporal Variations in Public Response to Government Policy, Alan M. MacEachren (PI), Jennifer Baka (CoPI), Prasenjit Mitra (CoPI), **Liping Yang (Postdoc)**, Internal (Penn State) Institute for CyberScience Seed Grant, May 2017 – May 2018.

Professional Service/Associations

Internal service

Reviewer, Seed Grant Proposal sponsored by Institute for CyberScience (ICS), Spring 2017, Pennsylvania State University.

Judge, EMS graduate poster competition, Spring 2017, Pennsylvania State University.

Membership of professional societies

2016 – present Member of International Association of Chinese Professionals in Geographical Information Sciences (CPGIS)

2016 – present Education Committee member of CPGIS

2016 – present Member of Association of American Geographers (AAG)

Reviewer (Journals)

International Journal of Geographical Information Science (IJGIS)

Computer Skills

- **GIS:** ArcGIS, ArcObjects, ArcGIS Engine, QGIS (formerly Quantum GIS); ERDAS Imagine, PCI, IDRISI, and MicroStation.
- **Programming languages:** C/C++, Java, Python, Scala, JavaScript, C#, Visual Basic.NET, Octave, Prolog, and NetLogo.
- **Database:** ESRI Geodatabase, Microsoft SQL Server, MySQL, MongoDB, SQLite, PostgreSQL, and PostGIS.
- **Document and web markup languages:** LaTeX, XML, and HTML.
- **3D modeling:** Unity3D and Blender.
- **Statistics:** R, SPSS, and S-PLUS.
- **Image and point cloud processing:** Processing, OpenCV (Open Source Computer Vision), PCL (Point Cloud Library), OpenNI, and Kinect.
- **Machine learning and deep learning:** TensorFlow, Keras, Scikit-learn, Gensim, and NLTK (Natural Language Toolkit).
- **High performance computing, parallel computing, and big data:** Apache Hadoop, Apache Spark, OpenMP, MPI (Message Passing Interface).
- **Geoparsing:** GeoTxt, GeoPy, GeoNames, and Google Cloud Natural Language API.
- **Web development:** Django web framework, Node.js, CSS, JavaScript, jQuery, AJAX, Bootstrap (front-end framework), D3.js, DC.js, Crossfilter, Leaflet.js, Turf.js, JSON, GeoJSON, TopoJSON, Mapbox, and OSM (OpenStreetMap).
- **Version control tools:** Git, GitHub, and Bitbucket.

- **Platforms:** Linux (Ubuntu, CentOS, and Red Hat), Windows, and Mac OS X.
- **General:** Microsoft Office Suite (Word, Excel, PowerPoint, Access, Visio), Apache OpenOffice, and LibreOffice.
- **Others:** Protégé, Adobe Photoshop, and tmux.

References

Prof. Michael Worboys (PhD Advisor)
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Old Royal Naval College, Park Row, London SE10 9LS
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Prof. Kate Beard (PhD Co-Advisor)
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