Bingnan Li

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Education

- **University of New South Wales** Sydney, Australia
  PhD Candidate in Deep Learning and Geographic Information System *Aug 2018 - Present*
  Courses: Principle of Programming (93/HD), Data Structure & Algorithms (90/HD), Machine Learning & Data Mining.
  Research topic: Deep Learning-Based Spatio-Temporal Data Mining Using Multi-Source Geospatial Data.

- **Tsinghua University** Beijing, China
  Research Assistant in the Department of Industrial Engineering *Mar 2021 - Aug 2022*
  Research topic: Deep Learning-Based Digital Map Generation From Multi-Source Spatio-Temporal Data.

- **East China Normal University** Shanghai, China
  Master in Cartography and Geographic Information System *Sep 2011 - May 2014*
  Courses: GIS Program Design & Application of Software, Coastal Zone Remote Sensing, Introduction to GIS, Map Projection & GIS.

- **East China Normal University** Shanghai, China
  Bachelor of Geographic Information System *Sep 2007 - Jul 2011*
  Courses: Software Engineering & GIS Design, Computer Drawing, Signal and Remote Sensing Image Processing, Principle of WebGIS, Data Structures, Advanced GIS, Spatial Statistics and Operations, Computing Method, Analysis & Modeling of Spatial Data.

Skills Summary

- **Languages**: Python, R, C#, C, SQL, Java, JavaScript, bash, IDL
- **Tools**: ArcGIS (Pro), QGIS, Linux, Git, ArcEngine, GeoServer, ArcPy, Keras, TensorFlow, PyTorch

Work Experience

- **Meituan** Beijing, China
  Algorithm Engineer (Research Intern) *Mar 2021 - Aug 2022*
  - Involved in a research project of deep learning-based digital map generation from multi-source spatio-temporal data, and responsible for project investigation, implementation, result analysis and paper writing.
  - Proposed deep learning-based methods on extractions of spatial objects by Keras based on the Tensorflow backend.

- **National Marine Environment Monitoring Centre** Dalian, China
  GIS Engineer *Jun 2014 – Aug 2018*
  - Participated in several national research projects of GIS-based system development and environmental monitoring based on GIS & remote sensing images.
  - Responsible for GIS-based system development by ArcEngine, workflow development for automatic data processing by python & IDL, and thematic map production by ArcGIS.

Academic Projects

- **Deep learning-based spatio-temporal analysis of epidemic diseases using social media data** *(Aug 2018 - Present)*:
  - Constructed a multi-elemental geolocation inference method based on COVID-19 related tweets in the contiguous US.
  - Proposed a geolocation prediction method based on all potential location-related metadata of influenza-like illness related tweets.
  - Developed a CNN-BiLSTM model with attention mechanism for spatio-temporal sentiment analysis of COVID-19 related tweets.
- **Deep learning-based digital map generation from multi-source spatio-temporal data** *(Mar 2021 - Aug 2022)*:
  - Developed a multi-task Res-U-Net model with attention mechanism for extractions of building roofs and shapes from the high-rise buildings using remote sensing images, and applied an offset vector method to detect the building footprints.
  - Proposed a novel optimization model to detect multiple Areas-of-Interest simultaneously using geospatial data from an online food delivery platform, and solved the multi-AOIs detection problem.
  - Developed a decoder fusion model based on dilated Res-U-Net for interior road extraction within residential complexes leveraging remote sensing images and GPS trajectories.
- **The application of key technology in typical ecological disaster and pollution monitoring** *(Jun 2014 - Aug 2018)*:

- Responsible for the investigation, design and development of four GIS-based systems, i.e., emergency decision support system for harmful algal bloom hazard, the seawater quality spatial evaluation system based on multi-source data, risk assessment system for harmful algal bloom hazard, and losses assessment system for harmful algal bloom hazard.

- **Satellite remote sensing data receiving and processing system (Feb 2015 - Aug 2018)**:
  - Responsible for design, development and maintenance of the system for MODIS data receiving and automatic transfer via ftp.
  - Developed a workflow to process data automatically, and display on the data distribution web pages.

- **Remote sensing survey of global change and air-sea interactions** *(Feb 2015 - Aug 2018)*:
  - Responsible for workflow development for automatic processing of MOIDS data (HDF4 and NetCDF) by IDL.
  - Produced thematic maps of sea surface temperature and sea surface salinity of South China Sea, West Pacific Ocean, and East Indian Ocean based on ArcGIS.

- **Remote sensing monitoring of marine environment in Zhejiang, China** *(Jun 2014 – Aug 2018)*:
  - Responsible for workflow development for automatic MODIS data downloading and automatic data processing by shell and IDL.
  - Produced thematic maps of monthly sea surface temperature, chlorophyll a, seawater transparency, and total suspended matter.

Selected Publications

- **Bingnan Li**, Jiuchong Gao, Shuiping Chen, Samsung Lim, and Hai Jiang. POI Detection of High-Rise Buildings Using Remote Sensing Images: A Semantic Segmentation Method Based on Multi-Task Attention Res-U-Net. *IEEE Transactions on Geoscience and Remote Sensing* 60 (2022): 1-16.

- **Bingnan Li**, Liying Chen, Daping Xiong, Shuiping Chen, Samsung Lim, and Hai Jiang. Simultaneous Detection of Multiple Areas-of-Interest Using Geospatial Data from an Online Food Delivery Platform. *ACM SIGSPATIAL 2022*. (Accepted)

- **Bingnan Li**, Zi Chen, and Samsung Lim. Geolocation Inference Using Twitter Data: A Case Study of COVID-19 in the Contiguous United States. *Communications in Computer and Information Science* 1411 (2021): 119-139.

- **Bingnan Li**, Zi Chen, and Samsung Lim. Geolocation Prediction from Tweets: A Case Study of Influenza-like Illness in Australia. *GISTAM* (2020): 160-167.

- **Bingnan Li**, Jiuchong Gao, Shuiping Chen, Samsung Lim, and Hai Jiang. Interior Road Extraction within Residential Complexes: A Decoder Fusion Model Leveraging Remote Sensing Images and GPS Trajectories. *IEEE Transactions on Geoscience and Remote Sensing*. (Under Review)

- **Bingnan Li**, Samsung Lim. CNN-BiLSTM with Attention Mechanism for Spatio-Temporal Sentiment Analysis of COVID-19 Tweets. (In Preparation)

- Zi Chen, Badal Pokharel, **Bingnan Li**, and Samsung Lim. Location Extraction from Twitter Messages Using a Bidirectional Long Short-Term Memory Neural Network with Conditional Random Field Model. *Communications in Computer and Information Science* 1411 (2021): 18-30.

- Zi Chen, Badal Pokharel, **Bingnan Li**, and Samsung Lim. Location Extraction from Twitter Messages using Bidirectional Long Short-Term Memory Model. *GISTAM* (2020): 45-50.

- **Bingnan Li**, Yanlong Chen, Jianhua Zhao, et al. Design and Implementation of Losses Assessment System for Harmful Algal Bloom Hazard Based on GIS. *Marine Environmental Science* 39 (2020): 162-168. (In Chinese)

- **Bingnan Li**, Jianhong Yang, Xuezhong Jiang, et al. Design of the Seawater Quality Spatial Evaluation System Based on Multi-Source Data. *Marine Environmental Science* 34 (2015): 113-119. (In Chinese)

- **Bingnan Li**, Dongzhi Zhao, Xuezhong Jiang, et al. Conceptual Design of Emergency Decision Support System for Harmful Algal Bloom Hazard. *Marine Environmental Science* 33 (2014): 418-424. (In Chinese)

- **Bingnan Li**, Xuezhong Jiang, and Caixing Yun. Automatic Detection Method of Sea Use Change in Marine Cadastral Management System. *Journal of Geo-Information Science* 15 (2013): 680-687. (In Chinese)