Fangcao Xu (Fleur)

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Research Interests

➢ GIScience, Geospatial Big Data Analysis, Geospatial Modeling and Geo-visualization
➢ Applied Remote Sensing, Hyperspectral Imaging Analysis, Climate Modeling
➢ Natural Language Processing, Spatiotemporal Information Diffusion, Social Network Analysis
➢ Artificial Intelligence (AI), Deep Learning (DL), Time Series Forecasting

Education

Ph.D. in Geography, *Pennsylvania State University, USA*	**2019 – 2021**
Ph.D. Minor in Social Data Analytics (SoDA), *Pennsylvania State University, USA*	**2017 – 2021**
Master of Science, *Pennsylvania State University, USA*	**2016 – 2018**
Master of Urban Spatial Analytics, *University of Pennsylvania, USA*	**2014 – 2015**
Bachelor of Science in Surveying and Mapping Engineering, *Wuhan University, China*	**2010 – 2014**

Working Experience

Google, Machine Learning Software Engineer   **Oct 2021 – present**

- Develop machine learning algorithms to protect kids and families by detecting malicious android apps that violate policies and requirements on Google Play in sensitive verticals.

BASF, Weather/Climate Data Science Intern   **May 2021 – Aug 2021**

- Developed a data-driven deep learning downscaling model to improve estimates of field-specific agrometeorological variables using weather station observations and various historical climate geospatial datasets to provide support for BASF Digital Farming's R&D teams

Esri China Information Technology Co. Ltd, Data Scientist   **2015 – 2016**

- Developed algorithms for market analysis, including trading area analysis, site selection and route optimization based on collected geographic big data (e.g., POIs, real-time traffic data, etc.) for McDonald's, Mercedes-Benz, China Tobacco and China Minsheng Bank

Professional Skills

GIS/Geo-parsing:	ArcGIS, QGIS, GeoDA, Google Map API
Programming Language:	R, Python, Java, JavaScript, Shell Scripting, Scala, PHP, HTML
High Performance Computing:	Apache Spark, Apache Hadoop, Dask
Database:	AWS, MySQL, PostgreSQL, ESRI Geodatabase
Machine learning:	PyTorch, TensorFlow, Scikit-Learn
Others:	Linux, Interactive Web Development, NLP, LaTeX

Publications

1. **Xu, F.,** Sun, J., Cervone, G., & Salvador, M. (2021). Ill-posed surface emissivity retrieval from multi-geometry hyperspectral images using a hybrid deep neural network. *ISPRS Journal of Photogrammetry and Remote Sensing*. (Under Review)

2. Yu, M., **Xu, F.,** Hu, W., Sun, J., & Cervone, G. (2021). Using Long Short-Term Memory (LSTM) and Internet of Things (IoT) for localized surface temperature forecasting in an urban environment. *IEEE*

Access.

3. Sun, J., **Xu, F.,** Cervone, G., Gervais, M., Wauthier, C., & Salvador, M. (2021). Automatic atmospheric correction for shortwave hyperspectral remote sensing data using a time-dependent deep neural network. *ISPRS Journal of Photogrammetry and Remote Sensing, 174, 117-131*

4. **Xu, F.,** Cervone, G., Franch, G., & Salvador, M. (2020). Multiple geometry atmospheric correction for image spectroscopy using deep learning. *J. of Applied Remote Sensing, 14(2)*

5. **Xu, F.,** Desmarais, B., & Peuquet, D. (2020). STAND: A Spatio-Temporal algorithm for network diffusion simulation. *In Proceedings of the 3rd ACM SIGSPATIAL International Workshop on GeoSpatial Simulation, 20–29*

6. Chen, X., **Xu, F.,** Wang, W., Du, Y., & Li, M. (2018). Geographic big data's application in Retailing business. In: Big Data Support of Urban Planning and Management, pp. 157–176. *Springer, Cham*

7. MacEachren, A. M., Caneba, R., Chen, H., Cole, H., Domanico, E., Triozzi, N., **Xu, F.,** & Yang, L. (2018). Is This Statement About A Place? Comparing two perspectives. In proceeding of *International Conference on GIScience Short Paper*

Research Experience

Pennsylvania State University, University Park, USA   **2016 – 2021**

➢ **Research Assistant, Blue Heron Data Collection and Analytics**, 2020 – present
  - Collected 1.4 TB Hyperspectral Images around State College from an airborne gimbaled sensor
  - Developed a geometry-dependent hybrid neural network for target detection (Python, PyTorch)

➢ **Research Assistant, Defense Advanced Research Projects Agency (DARPA)**, 2019 – 2020
  - Developed an autoencoder convolutional neural network for atmospheric correction and target detection using multi-scan hyperspectral scenes (Python, PyTorch)
  - Simulated millions of hyperspectral data using the MODTRAN for the network training (Python)

➢ **Research Assistant, Internet of Things into Weather Forecast**, Summer 2020
  - Processed Internet of Things data collected along the major road of New York by every 1 hour
  - Developed a Long Short-Term Memory network for surface temperature forecast (Python, PyTorch)

➢ **Research Assistant, Cyber Bullying on Twitter**, Summer 2018
  - Investigated cyber bullying from 5 TB tweets that are relevant to the Women's March
  - Applied techniques including PostgreSQL query, statistical analysis, and interactive web mapping

➢ **Research Assistant, Comment Analytics**, Summer 2017
  - Used OCR to convert more than 4000 PDF documents into recognizable text (Java)
  - Preformed classification and sentiment analysis on unstructured text data to understand spatiotemporal variations of public response to government policy

➢ **Natural Language Processing and Network Analysis of GOP Press Releases**, Spring 2018
  - Text analysis via name entity recognition and geocoding to identify communities within the co-occurrence network using the walktrap algorithm (Java, R, Stanford NER, Google API)

University of Pennsylvania, USA   **2014 – 2015**

➢ **Spatiotemporal analysis of bike travelling**, Chicago
  - Developed a geographic interactive map to find spatiotemporal hotspots of Divvy Bike stations with the route guidance by analyzing different user groups' mobility patterns (ArcGIS, HTML)

➢ **Housing Price Prediction with the Regression Model**, Philadelphia

- Built a regression model to reveal the key influential factors on the housing sale price with 44 socio-economic and spatial variables, collected from open data sources (ArcGIS)

Teaching Experience

Pennsylvania State University, Department of Geography

Fall 2018   GEOG 364: Spatial Analysis   **Fall 2017, 2020**   GEOG 365: GIS Programming

Extracurricular Activities

2014-2015   Member of Chinese Student & Scholars Association at UPenn (CSSAP)
2010-2014   Debater for both School of Geodesy and Geomatics and Wuhan University

Awards and Honors

2019   Academic Enrichment Award, Fall 2019
2019   Best Student Poster Award in 20th Annual Conference IAMG 2019
2013, 2012   Scholarship of Wuhan University& Merit Student of Wuhan University
2012   Ranked 3rd in the Autumn Dancing Competition of Wuhan University
2011, 2010   Best Debater for Freshman Cup Debate Competition of Wuhan University