

Ying Lu

Department of Computer Science, Viterbi School of Engineering,
University of Southern California, Los Angeles, CA 90089, USA

Tel: (+1)213-308-0600 E-mail: ylu720@usc.edu Homepage: <http://www-scf.usc.edu/~ylu720/>

OBJECTIVE

A full-time research or engineering position starting from February 2018.

SUMMARY

- Eight-year programmer and researcher specializing in geospatial and textual data management, large scale mobile video search, geo-multimedia data analysis, and location-based services.
- Co-author of 15 papers published in prestigious venues (e.g., SIGMOD, TODS, GIS).

EDUCATION

University of Southern California, Los Angeles, California, US 08/2012 – 12/2017 (Expected)

Ph.D. Candidate in Computer Science. Advisor: Prof. Cyrus Shahabi
Thesis: *Efficient Indexing and Querying of Geo-tagged User-Generated Videos*

Renmin University of China, Beijing, China 09/2009 – 07/2012

M.Phil. in Computer Science. Advisor: Prof. Jiaheng Lu
Thesis: *Reverse Top-k Spatial Keyword Search*

Zhengzhou University, Henan, China 09/2005 – 07/2009

B. Eng. in Computer Science

PROFESSIONAL SKILLS

Programming Languages: C/C++, Java, Python, Shell Script, C#, R, JavaScript, PHP, SQL, Matlab

Database Systems: MySQL, Oracle, Teradata, MongoDB, Cassandra

Big Data Highlights: MapReduce, Hadoop, Spark, MS Azure, Parallel Computing, Druid, IBM InfoStreams

Mobile Computing: Android Application Development, Maps, 3D Virtual Globes and Maps, Unity 3D Game Engine

Computer Vision: OpenCV, FFmpeg, AutoStitch, VLFeat, Sfm bundler

Data Analytics: Data Mining, Machine Learning, Tensorflow, Weka

RESEARCH EXPERIENCES

USC – Information Lab., Los Angeles, CA Research Assistant 08/2012 – present

Topic 1: Large-scale Mobile Video Indexing and Searching

- Challenges: 1) large number of videos; 2) casual way recording; 3) keep increasing.
- Ground Mobile Videos
 - Attacked the challenges by modelling the fields of view (pie-shaped FOVs) of videos with their geo-sensor metadata: camera GPS locations and viewing directions [MMSys'14].
 - Proposed a class of index structures and search algorithms for FOVs to improve the video query performance by a factor of two [GIS'14] [GeoInformatica'16].
- Aerial Mobile Videos / Drone Videos
 - Proposed a pyramid-shaped coverage model for drone videos and proposed a new index structure and a novel search algorithm to improve the query performance by 70% [GIS'17 under review].

Topic 2: Scenic Trip Planning on Road Networks

- Find the most scenic (or safest, cleanest or with the most Pokémon GO items) path from a source to a destination within a travel time budget.
- Challenges: 1) street attractiveness evaluation; 2) large-scale network; 3) NP-hard problem.
- Analyzed geo-tagged photo/videos with machine learning techniques to identify the attractiveness of streets.
- Proposed a heuristic algorithm with spatial indexing and pruning techniques which achieves over 95% accuracy within 0.3 seconds on Los Angeles road network [GIS'15].
- Find the scenic path on time-dependent road networks. Proposed an approximate algorithm which is 10,000 faster than the optimal solution while keeping the accuracy loss less than 50% [CIKM'17].

Topic 3: Key Video Frame Selection with Spatial Filtering for Computer Vision Applications

- Target tracking: 10x speedup, 90% precision, and 75% recall [MMC'15 Best Paper Award] [JIVP'17].
- Panorama generation: 20x speedup while preserving the visual quality [W2GIS'14].
- 3D model construction: 7x speedup while preserving the visual quality [ICME'14].

Samsung Research America, Mountain View, CA Research Intern 05/2016 – 08/2016

- Top-k points of interest detection from geo-tagged mobile videos and 360° videos in an area.
- Challenges: 1) videos are large-scale and are continuously generated; 2) city-level areas; 3) time-aware POIs.
- Designed a clustering & incremental sampling algorithm based on the FOVs of videos, offering up to 2000x speedup while keeping the accuracy loss less than 20% [arXiv preprint'17].

Teradata – Optimizer Group, El Segundo, CA Software Engineer Intern 05/2015 – 08/2015

- Estimate the query plan costs and query selectivity in Teradata optimizer.
- Explored machine learning techniques for the estimations which reduce the (RMSE) error by 70% compared to Teradata existing histogram model.

- | | | |
|---|--------------------|-------------------|
| National University of Singapore, Singapore | Research Intern | 06/2009 - 08/2009 |
| <ul style="list-style-type: none"> • Geo-textual Data Indexing and Query Processing. • Proposed a new type of spatial-keyword query: reverse spatial keyword query (RSKQ), which finds objects that have the query object as their top-k spatial-keyword relevant objects. | | |
| Renmin University of China, Beijing, China | Research Assistant | 09/2009 – 07/2012 |
| <ul style="list-style-type: none"> • Geo-textual Data Indexing and Query Processing for RSKQ. • Challenge: Geo-textual data includes both spatial and textual information. • Proposed a class of hybrid index structures and branch-and-bound search algorithms to answer RSKQ, which outperform a non-naïve baseline by two orders of magnitude [SIGMOD'11]. • Proposed a model to theoretically analyze the query costs for RSKQ [TODS'14]. | | |
| Nanyang Technological University, Singapore | Research Intern | 09/2010 – 05/2011 |
| <ul style="list-style-type: none"> • Geo-textual Data Indexing and Query Processing for RSKQ. • Proposed an optimized algorithm to minimize I/O costs for processing RSKQ [GIS'15]. | | |

KEY PROJECTS

-
- | | |
|--|-------------------|
| MediaQ (Website and Demo) | 08/2012 – present |
| MediaQ is a system to collect, analyze, share and search mobile videos. Each frame is modeled with W4-metadata: capture time (when), location (where), keywords (what) and people shown in the frame (who). | |
| <ul style="list-style-type: none"> • Leading the development team in media collection and system backend web services: <ul style="list-style-type: none"> – Developed Android and iOS apps to collect videos and geo-sensor data through spatial crowdsourcing. – Database schema design and indexing. Used MySQL & MongoDB. – Advanced video search. Used PHP. – Video auto-tagging via OpenStreetMap. Used Java servlet. – Face detection from videos. Use C++. • Released a five-year worldwide geo-video dataset [MMSys'16]. | |
| DroneQ (Demo) | 04/2017 – present |
| DroneQ is a system to collect, organize and search drone videos using automatically tagged geospatial metadata. | |
| <ul style="list-style-type: none"> • Leading in the system design and development. <ul style="list-style-type: none"> – Each drone video frame is modeled as a 3D pyramid-shaped field of view. – Support 3D spatial queries of drone videos on Google Earth and Cesium 3D maps. Used JavaScript. | |
| iWatch (Details) | 08/2012 – 09/2014 |
| iWatch is a multi-source collection and event detection for intelligent surveillance of criminal activity. | |
| <ul style="list-style-type: none"> • Developed an Android app for continuous mobile video collection. Used Java and Google Cloud Message. • Developed algorithms for continuous spatio-temporal video querying. Used JavaScript and PHP. • Developed algorithms for stalking event detection from mobile video trajectories and tweets. Used Java. | |

HONORS & AWARDS

-
- Student Travel Awards for ICDE09, SIGMOD11, ICME14, GIS14-15, WiSE14-17
 - Best Paper Award in IEEE International Workshop on Mobile Multimedia Computing, 2015
 - Outstanding Graduate in Beijing, China, 2012
 - 1st Prize Scholarship in Renmin University of China, 2009 – 2012
 - Outstanding Graduate in Zhengzhou University, China, 2009
 - 1st Prize Scholarship in Zhengzhou University, China, 2005 – 2009

SELECTED PUBLICATIONS

-
1. **Y. Lu***, G. Jossé*, T. Emrich, U. Demiryurek, M. Renz, C. Shahabi, and M. Schubert (*Equal Contributions). “Scenic Routes Now: Efficiently Solving the Time-Dependent Arc Orienteering Problem.” In ACM International Conference on Information and Knowledge Management (CIKM), 2017 (to appear).
 2. **Y. Lu**, C. Shahabi and S. Kim. “Efficient Index and Retrieval of Large-scale Geo-tagged Video Databases.” In Journal of GeoInformatica, pages 1 – 29, 2016.
 3. **Y. Lu**, H. To, A. Alfarrarjeh, S. Kim, Y. Yin, R. Zimmermann and C. Shahabi. “GeoUGV: User-generated Mobile Video Dataset with Fine Granularity Spatial Metadata.” In ACM Multimedia Systems (MMSys), pages 43:1–43:6, 2016.
 4. **Y. Lu** and C. Shahabi. “An Arc Orienteering Algorithm to Find the Most Scenic Path on a Large-scale Road Network.” In ACM SIGSPATIAL GIS, pages 46:1 – 46:10, 2015.
 5. Y. Cai, **Y. Lu**, S. Kim, L. Nocera and C. Shahabi. “GIFT: A Geospatial Image and Video Filtering Tool for Computer Vision Applications with Geo-tagged Mobile Videos.” In IEEE Intl. Workshop on Mobile Multimedia Computing (MMC), pages 1 – 6, 2015 (**Best Paper Award**).
 6. **Y. Lu**, C. Shahabi and S. Kim. “An Efficient Index Structure for Large-scale Geo-tagged Video Databases.” In ACM SIGSPATIAL GIS, pages 465-468, 2014.
 7. **Y. Lu**, J. Lu, G. Cong, W. Wu, and C. Shahabi. “Efficient Algorithms and Cost Models for Reverse Spatial-Keyword k-Nearest Neighbor Search.” In ACM Trans. Database Syst. (TODS) 39(2):13, 2014.
 8. J. Lu, **Y. Lu**, and G. Cong. “Reverse Spatial and Textual k Nearest Neighbor Search.” In ACM Conference on Management of Data (SIGMOD), pages 349 – 360, 2011.