Meida Chen Ph.D.

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Working Experience

- Senior Research Associate at USC Institute for Creative Technologies 2020 – present
  Responsibility: Leading the research on 3D computer vision, developing software prototypes, publishing in top-tier conferences and journals, preparing proposals, and mentoring students.
- Lecturer in Civil and Environmental Engineering at USC 2021 – present
- Research Associate at USC Institute for Creative Technologies 2020 – 2022
- Research Assistant at USC Institute for Creative Technologies 2014 – 2020

Education

University of Southern California Los Angeles, CA

- Doctor of Philosophy in Civil Engineering (GPA: 3.95/4.00) May 2020
  - Focusing on designing and developing ML and CV pipeline for 3D data perception
- Master of Science in Computer science (GPA: 3.89/4.00) December 2018
- Master of Construction Management (GPA: 3.95/4.00) May 2014

Talks, Academic Services, & Awards

- Organizing 2ed Urban3D Workshop about 3D Point Cloud Understanding at ECCV 2022.
- Organizing 3rd Urban3D Workshop about 3D Point Cloud Understanding at ICCV 2023.
- Best paper in simulation at Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC), 2019, Orlando, FL, U.S.
- Invited as a panel speaker at GEOINT, Working with GEOINT at Scale - Leveraging Machine Learning. 2018, San Antonio, TX, U.S.
- Reviewer: IEEE TPAMI, IEEE CVPR, ISPRS Journal of Photogrammetry and Remote Sensing, Automation in Construction, Advanced Engineering Informatics, Journal of Computing in Civil Engineering, etc.

Projects

STPLS3D: A Large-Scale Synthetic and Real Aerial Photogrammetry 3D Point Cloud Dataset

This work provides a large-scale aerial photogrammetry dataset with synthetic and real annotated 3D point clouds for training deep learning networks on semantic and instance segmentation tasks. The datasets have been made publically available at www.STPLS3D.com with benchmark APIs released at [here].

- Designed and developed a fully automated synthetic data generation system and created a richly-annotated synthetic 3D aerial photogrammetry point cloud dataset (demo video available at [here]).
- Designed and developed a QGIS plugin for downloading open-sourced geospatial data and creating 2D scene layouts.
- Designed and developed an Unreal4 plugin for importing 3D assets, placing 3D objects based on the given 2D layout, automatically modifying object materials using Blueprints, etc.
- Created a UAV simulator using AirSim Python APIs in Unreal4 for aerial data synthesis.
- Implemented the 2D/3D label projection processes using PCL, OpenCV, PDAL, etc.
- Created a competition server on CodaLab at [here] for a fair evaluation of future research and organizing Urban3D workshop@ECCV2022.

Semantic Terrain Point Labeling System (STPLS)

This work is part of the U.S. Army One World Terrain (OWT) efforts to provide individuals with the organic capability to rapidly create geo-specific virtual environments for training and rehearsal purposes. In this work, a stand-alone application was developed to extract semantic and object information (attributes) to assign physical properties to each object in the 3D virtual terrain which allows robust user interaction with the simulation system, overview demo video is available at [here].

- Implemented various 3D deep learning networks (e.g., KpConv, RandLA, SCF-Net, 3DMV, PointGroup, HAIS, 3D U-Net, PointNet++, etc.) for point cloud segmentation using PyTorch, Tensorflow, Keras, etc.
- Designed and developed various automated pre- and post-processing methods for data cleaning, fusing, formatting, etc.
- Created interactive point cloud/image annotation tools with traditional machine learning algorithms (e.g., Random forest, SVM, K-means, etc.)
- Designed and developed a region of interest selection interface using Google Maps API.
- Designed and developed the main GUI with Tkinter.

Proactive 2D Model-based Scan Planning for Existing Buildings

3D laser scanning is a time-consuming and labor-intensive process, surveyors oftentimes are facing situations in which the collected data are 1) incomplete or 2) low quality that does not meet the project requirements. This work designed and developed a proactive scan-planning framework for scanning building facades to reduce surveyors' on-site decision-making during the laser scanning process and achieve a high-quality 3D point cloud.

- Designed and developed a planning system that consists of a set of optimization algorithms and is capable of: (1) automatically creating a scan plan that contains the minimum scanning positions based on the known point cloud-quality impact factors, target building site conditions, and project requirements.
- Conducted experiments to evaluate and validate the designed system using 64 real buildings.

Publications

- Yu, Zifan, Meida Chen, Zhikang Zhang, Suya You, Raghuveer Rao, Sanjeev Agarwal, and Fengbo Ren. (2023) "TransUPR: A Transformer-based Plug-and-Play Uncertain Point Refiner for LiDAR Point Cloud Semantic Segmentation." IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), pp. 5864-5869. IEEE, 2023. [paper]
- Meida Chen, Qingyong Hu, Hugues THOMAS, Andrew Feng, Yu Hou, Kyle McCullough, Lucio Soibelman, (2022) "STPLS3D: A Large-Scale Synthetic and Real Aerial Photogrammetry 3D Point Cloud Dataset", 33rd British Machine Vision Conference (BMVC Oral). [paper]
- Yu Hou, Meida Chen, Rebekka Volk, Lucio Soibelman, "An approach to semantically segmenting building components and outdoor scenes based on multichannel aerial imagery datasets." Remote Sensing 13, no. 21 (2021): 4357. [paper]
- Yu Hou, Meida Chen, Rebekka Volk, and Lucio Soibelman. (2021). "Investigation on Performance of RGB Point Cloud and Thermal Information Data Fusion for Building Thermal Map Modeling Using Aerial Images under Different Experimental Conditions" The Journal of Building Engineering. [paper]
- Yu Hou, Rebekka Volk, Meida Chen, and Lucio Soibelman. (2021). "Fusing tie points' RGB and thermal information for mapping large areas based on aerial images: A study of fusion performance under different flight configurations and experimental conditions." Automation in Construction, 124, 103554. [paper]
- Meida Chen, Andrew Feng, Kyle McCullough, Pratusha Bhuvana Prasad, Lucio Soibelman, (2021). "Ground Material Segmentation for UAV-based Photogrammetric 3D Data: A 2D-3D Hybrid Approach" Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC). [paper]
- Meida Chen, Andrew Feng, Kyle McCullough, Pratusha Bhuvana Prasad, Ryan McAlinden, Lucio Soibelman, (2020) "Generating Synthetic Photogrammetric Data for Training Deep Learning-based 3D Point Cloud Segmentation and 2D Object Detection Models", Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC). [paper]
- Meida Chen, Andrew Feng, Kyle McCullough, Pratusha Bhuvana Prasad, Ryan McAlinden, Lucio Soibelman, (2020) "Semantic Segmentation and Data Fusion of Microsoft Bing 3D Cities and Small UAV-based Photogrammetric Data", Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC). [paper]
- Kyle McCullough, Andrew Feng, Meida Chen, Ryan McAlinden, (2020). "Utilizing Satellite Imagery Datasets and Machine Learning Data Models to Evaluate Infrastructure Change in Undeveloped Regions." Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC). [paper]
- Meida Chen, Andrew Feng, Kyle McCullough, Pratusha Bhuvana Prasad, Ryan McAlinden, Lucio Soibelman, (2019). "Fully Automated Photogrammetric Data Segmentation and Object Information Extraction Approach for Creating Simulation Terrain" Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC). **(Best paper)** [paper]
- Chen, M., Feng, A., McCullough, K., Bhuvana Prasad, P., McAlinden, R., & Soibelman, L. (Forthcoming). (2019) "3D photogrammetry point cloud segmentation using a model ensembling framework" ASCE Journal of Computing in Civil Engineering, doi:10.1061/(ASCE)CP.1943-5487.0000929. [paper]
- Meida Chen, Andrew Feng, Ryan McAlinden, Lucio Soibelman, (2019). "Photogrammetric Point Clouds Segmentation and Objects Information Extraction for Creating Virtual Environments and Simulations" ASCE Journal of Management in Engineering**,** 36(2), 04019046. [paper]
- Meida Chen, Ryan McAlinden, Ryan Spicer, and Lucio Soibelman, (2019). "Semantic Modeling of Outdoor Scenes for the Creation of Virtual Environments and Simulations." In Proceedings of the 52nd Hawaii International Conference on System Sciences. [paper]

- Hou, Yu, Lucio Soibelman, Rebekka Volk, and Meida Chen. (2019) "Factors Affecting the Performance of 3D Thermal Mapping for Energy Audits in A District by Using Infrared Thermography (IRT) Mounted on Unmanned Aircraft Systems (UAS)." International Symposium on Automation and Robotics in Construction (ISARC), Banff, Canada. [paper]
- Meida Chen, Eyuphan Koc, Zhuoya Shi, and Lucio Soibelman. "Proactive 2D model-based scan planning for existing buildings." Automation in Construction 93 (2018): 165-177. [paper]
- Meida Chen, Lucio Soibelman, and Burcin Becerik-Gerber. "A Proactive Scan Planning Framework for Courtyard-Centric Buildings" ICCCBE2016 16th International Conference on Computing in Civil and Building Engineering, July 6-8, 2016, Osaka, Japan. [paper]
- Eloisa Dezen-Kempter, Lucio Soibelman, Meida Chen, and Alexandre Victor Müller Filho. "An integrated laser and image surveying approach in support of model-based information technology for inventory of campus historic buildings." In CIB W78 Conference, Eindhoven, the Netherlands. 2015. [paper]
- Eloisa Dezen-Kempter, Lucio Soibelman, Meida Chen, and Alexandre Victor Müller Filho. "Escaneamento 3D a laser, fotogrametria e modelagem da informação da construção para gestão e operação de edificações históricas." Gestão & Tecnologia de Projetos 10, no. 2 (2015): 113-124. [paper]

Skills

- Languages: Python (primary language), Java, SQL, HTML
- Libraries: PyTorch, Keras, Sklearn, AirSim, point cloud library (PCL), Open3D, OpenCV, NumPy, PDAL, etc.
- Deep Learning Models: KpConv, RandLA, SCF-Net, 3DMV, PointGroup, HAIS, 3D U-Net, PointNet++, etc.
- Machine Learning: Decision Trees, Random Forest, SVM, Neural Networks, KMeans, GMM(s), Logistic Regression, etc.