

**WILSON REN**  
**Canadian Citizen: No need for VISA sponsorship**  
**1132 16th St N - 11-A Fargo, ND 58102**  
**Phone: (832) 298-7825 • E-mail: yihao.ren@ndus.edu**

## SKILLS

---

- **Machine/Deep Learning:** Classification, Regression, Feature selection, Data manipulation and visualization, Convolutional neural network, Recurrent neural network, Graph neural network, PointNet, PointNet++, Dynamic graph neural network, Data standardization, SQL, Data Mining.
- **Computer Vision:** LiDAR point cloud pre/post processing, Object detection using LiDAR point cloud and imagery data.
- **Tools:** Python (Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, SciPy, LightGBM, XGBoost, Scikit-Spatial, Dask, H2O, Tensorflow, Keras, PyTorch, OpenCV, Open3D), MATLAB, Linux System, Geographic information system, Statistical Analysis System (SAS), Tableau, CPLEX, Git.

## EDUCATION

---

<b>Doctorate in Transportation, Logistics and Finance</b>	Aug 2019-Dec 2022
North Dakota State University, Fargo, North Dakota	
<b>Master of Science in Construction Management</b>	Aug 2017-Jun 2019
University of Houston, Houston, Texas	
<b>Bachelor of Science in Petroleum Engineering</b>	Sept 2008-June 2012
University of Alberta, Edmonton, Alberta	

## Research Projects

---

- Leading the research project of automated rail extraction method using low-cost LiDAR sensor and machine learning methods. (Under Review by IEEE Sensors)
  - Algorithms: Isolation Forest, DBSCAN Modified K-mean Clustering, Modified Nearest Neighbor, Hyper Least Square Fit, and Gaussian Mixture Model.
  - Results: The overall performance shows average completeness of 96.97%, correctness of 99.71%, and quality of 96.67% for all extraction scenarios.
  - Contributions: Extracted rail tracks from extremely low LiDAR point cloud data (292 point/m<sup>2</sup> where others use around 900 point/m<sup>2</sup>).
- Leading the research project of automated rail extraction method using low-cost lidar sensor and dynamic graph convolutional neural network (DGCNN). (In progress).
  - Algorithms: Dynamic Graph Neural Network (DGCNN)
  - Contributions: Developing a pipeline of automated rail extraction method using extremely low-density point cloud data (292 point/m<sup>2</sup> where others use around 900 point/m<sup>2</sup>). The developed pipeline should be able to reduce unnecessary assumptions used in the previously developed machine learning based pipeline.
- Leading the research project of rail gage-based risk detection based on iPhone 12 LiDAR. (Under Review by IEEE Transactions on Engineering Management).
  - Algorithms: Logistic regression and Gaussian process classifier
  - Results and Contributions: Narrowed down the possible “high-risk” gage sections and significantly reduce the rail inspection workload by 48%.
- Leading the research project of predicting suspected elder fraud. (Under Review by MindSumo)

## WILSON REN

1132 16th St N - 11-A Fargo, ND 58102

Phone: (832) 298-7825 • E-mail: yihao.ren@ndus.edu

- Algorithms: Extreme gradient boosting (XGBoost), light gradient boosting machine (Light XGBoost), and gradient boosting
- Results and Contributions: Developed a reusable fraud detection pipeline, and the final result achieved an average f1 score of 98.5%.
- Leading the research project of prediction of Network-Level travel time considering the effects of weather and seasonality using Python, TensorFlow and Scikit-Learn.
  - Algorithms: Convolutional neural network, ridge regression, linear regression, support vector machine, decision tree regressor, lasso regression.
  - Results and Contributions: It was found CNN model with 3 convolutional layer, 128 nodes, and 2 dense layers outperform traditional machine learning methods by 26%.
- Completed missing pavement performance data imputation using graph neural networks. (Accepted for presentation by U.S. Department of Transportation)
  - Algorithms: Graph neural network (GNN)
  - Results and Contributions: The developed model outperforms traditionally used random forest model by around 5%.

## WORK EXPERIENCE

---

### Jr Drilling Engineer

Range Resource Drilling Ltd

July 2015-Jan 2017

Siparia Trinidad and Tobago

### Sales Representative

Kia West

Mar 2014-June 2015

Vancouver, Canada