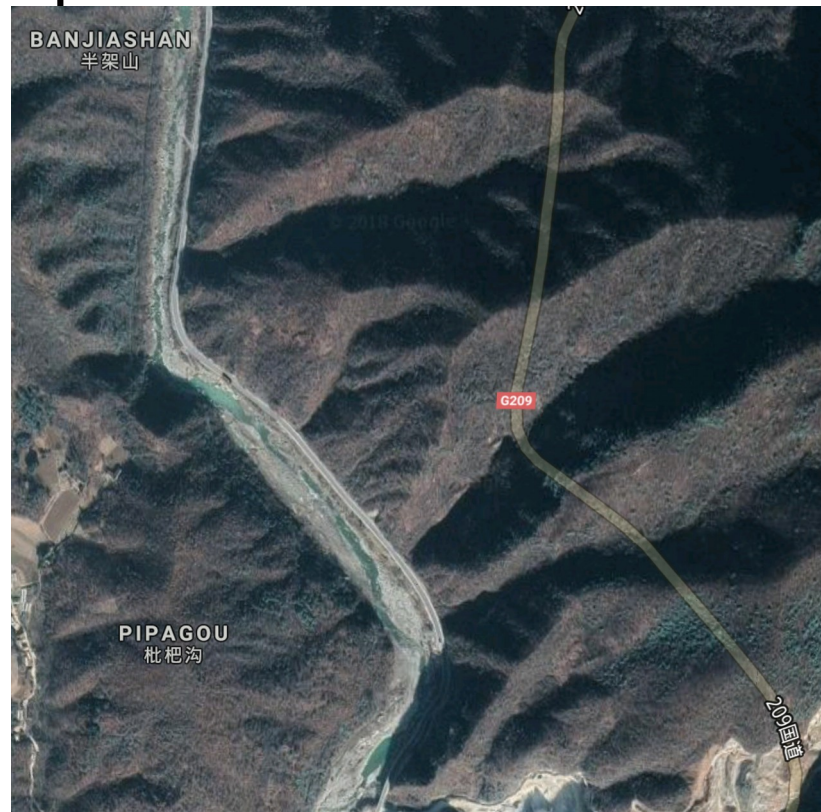


# Point Cloud and Aerial Image Misalignment

Presented by:  
Neil Getty

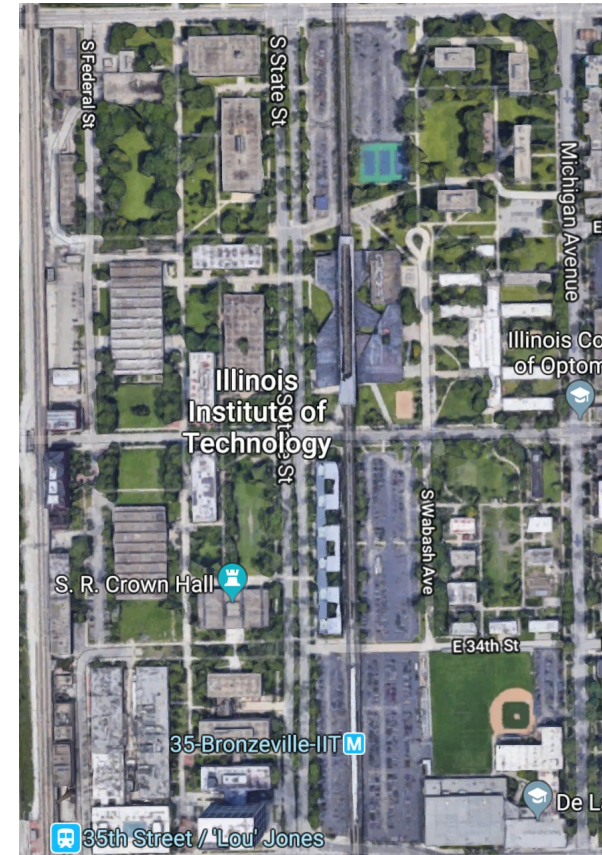
# Introduction

- Registering/aligning images of separate modalities is a hard but important problem
- Richer, more accurate maps

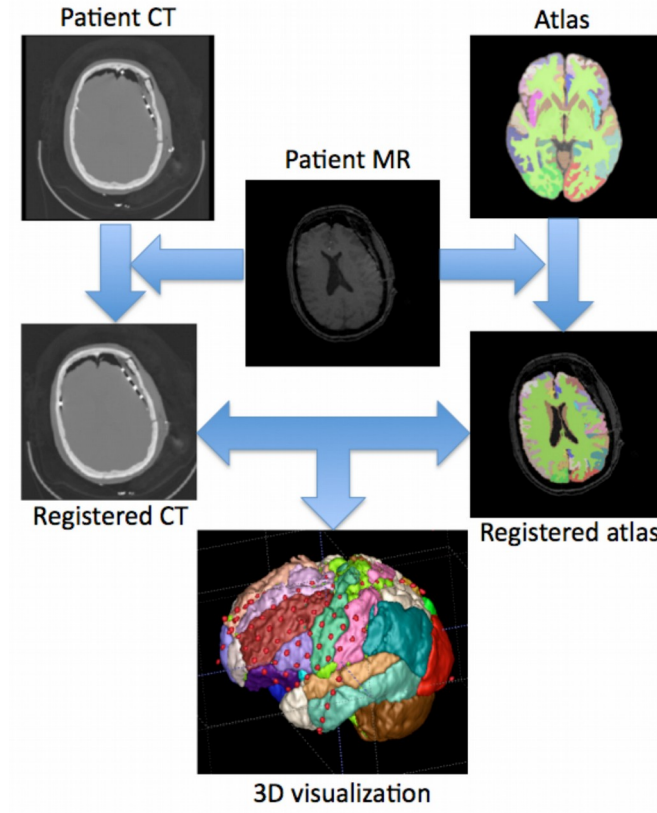


# Perfect Alignment

- Necessary for humans?
- What about AI?
- Is perfection attainable?

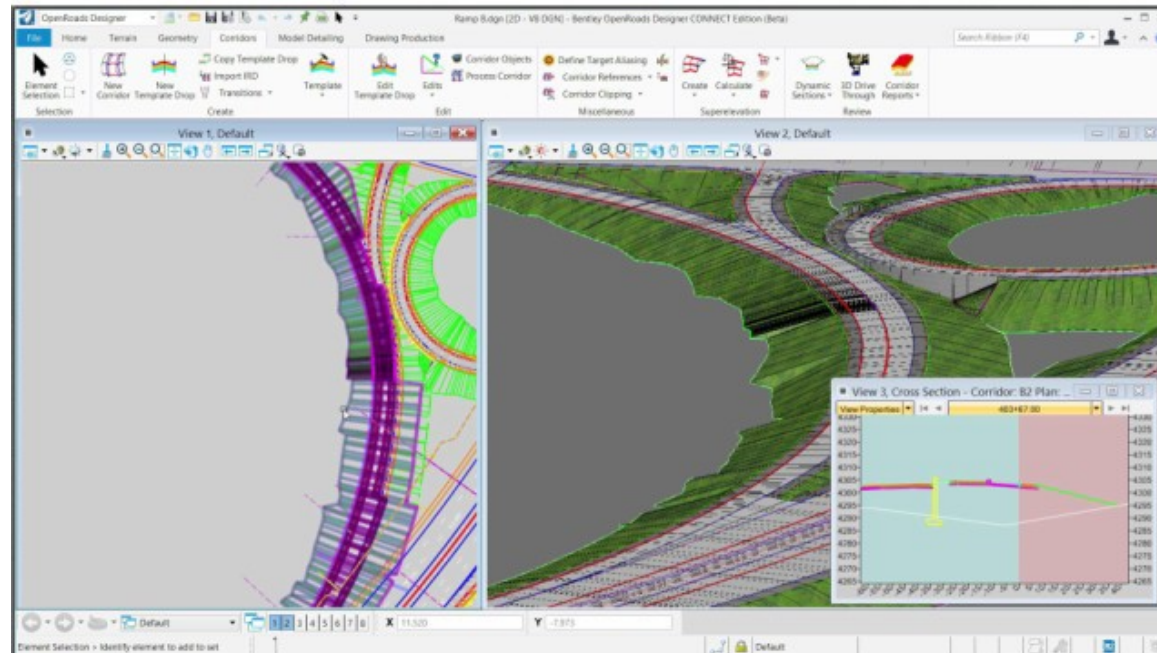


# Registration problem not unique to mapping...



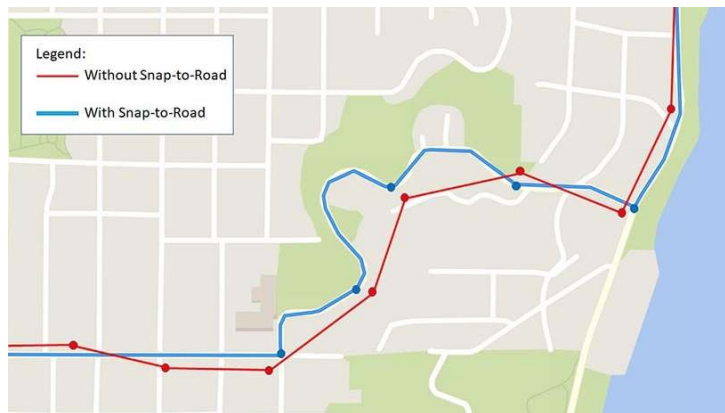
# Methodologies - Manual

- Use mapping software to manually edit
- OpenRoads Designer:



# Methodologies - Automated

- Bing API
- Snap-to-road

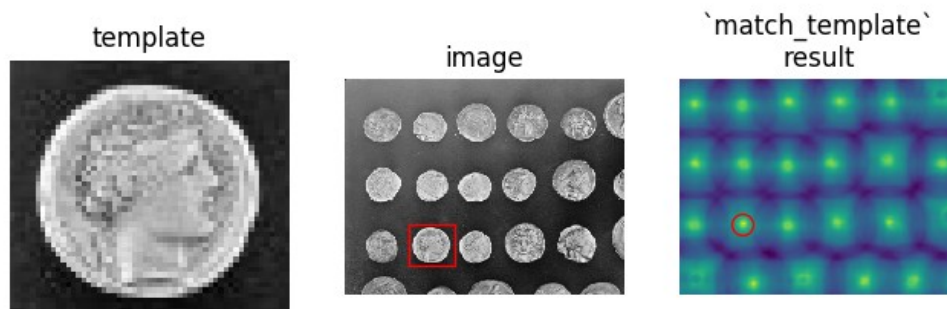


<https://www.microsoft.com/en-us/maps/snap-to-road>

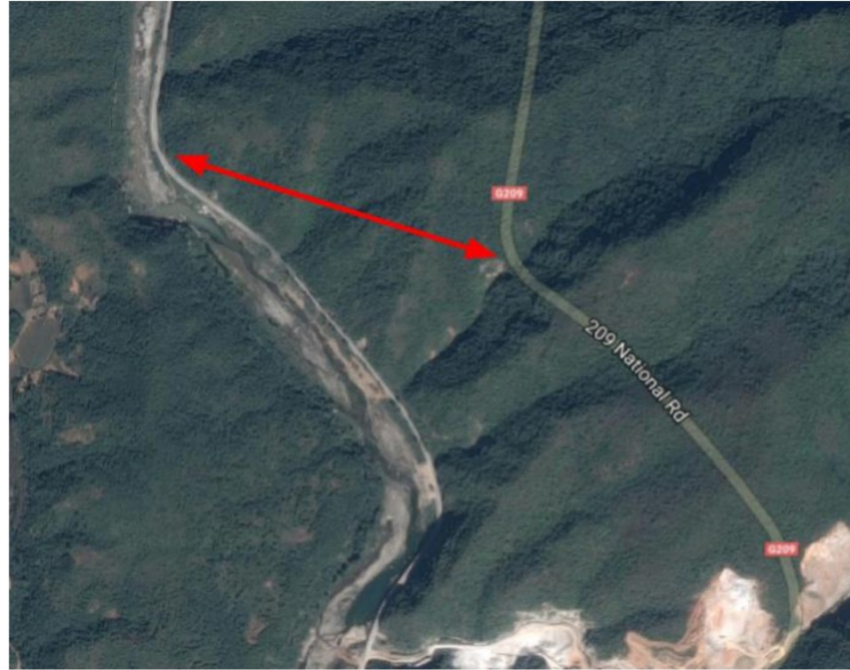


# Methodologies - Automated

- Normalized cross correlation



# Can this be applied here?



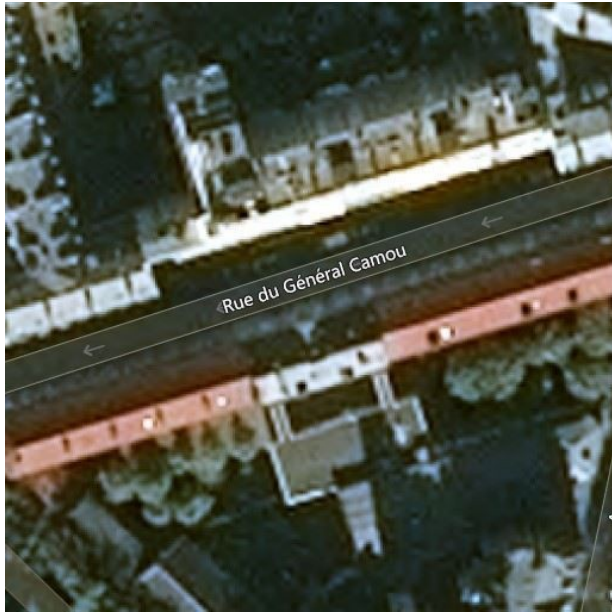


# Start with segmentation



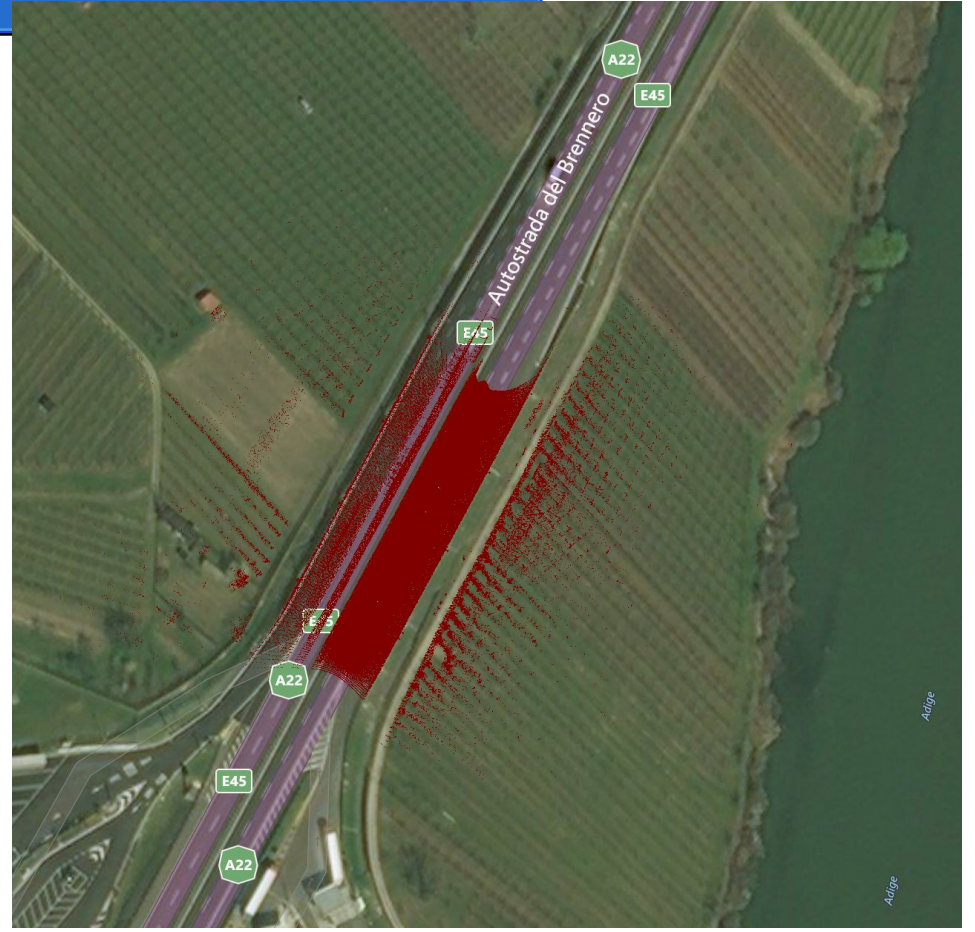
Yuan et.al. Road Segmentation in Aerial Images by Exploiting Road Vector Data

# Example projection





# Example Projection



# Experiment

- Smoothing

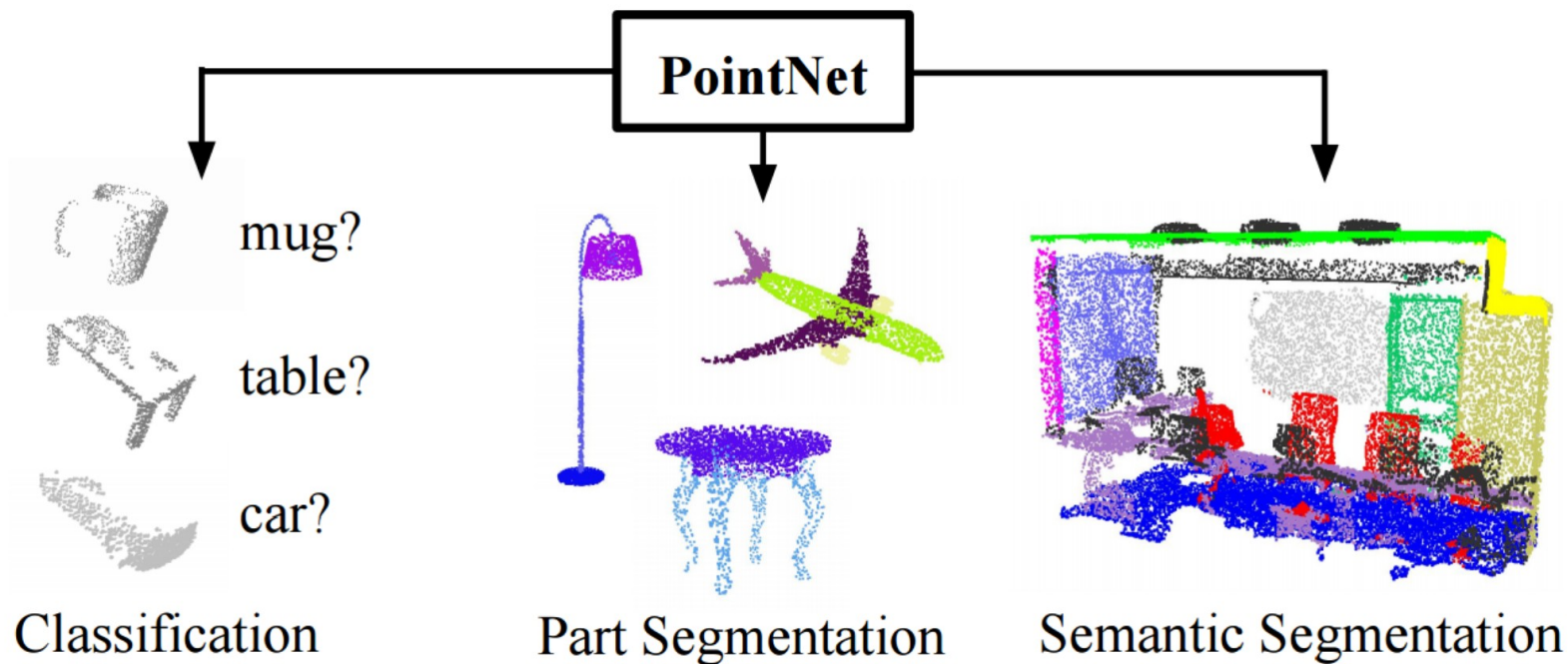




# Future experiments

☞ **PointNet: Deep Learning on Point Sets for 3D Classification and Segmentation**

Created by [Charles R. Qi](#), [Hao Su](#), [Kaichun Mo](#), [Leonidas J. Guibas](#) from Stanford University.



# Future Experiments

## A LiDAR Point Cloud Generator: from a Virtual World to Autonomous Driving

---

### 3D Point Cloud Registration for Localization using a Deep Neural Network Auto-Encoder

Gil Elbaz      Tamar Avraham      Anath Fischer  
Technion - Israel Institute of Technology

**Xiangyu Yue**  
EECS, UC Berkeley  
xyyue@berkeley.edu

**Bichen Wu**  
EECS, UC Berkeley  
bichen@berkeley.edu

**Kurt Keutzer**  
EECS, UC Berkeley  
keutzer@berkeley.edu

**Alberto Sangiovanni-Vincentelli**  
EECS, UC Berkeley  
alberto@berkeley.edu

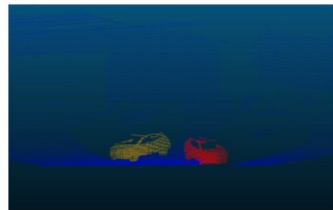
**Sanjit A. Seshia**  
EECS, UC Berkeley  
sseshia@eecs.berkeley.edu



(a)



(b)



(c)



# Questions?

- Thank you