

## Early Community Intervention for Neighborhood Revitalization Using Artificial Intelligence and Emerging Technologies

NSF Project ID: 1951971

Yugyung Lee, University of Missouri – Kansas City

Award Type: PG, FY2020

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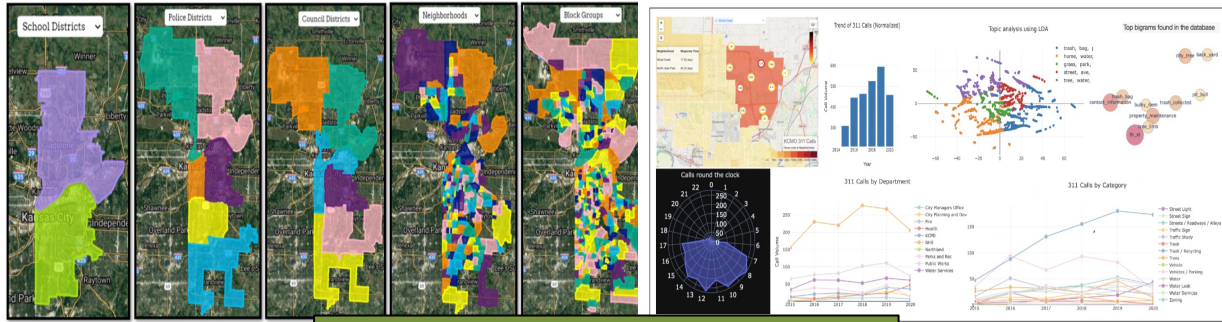
### Community Partners

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Kate Bender, City of Kansas City, Missouri  
Amanda Graor, Mid-America Regional Council  
Aaron Deacon, KC Digital Drive

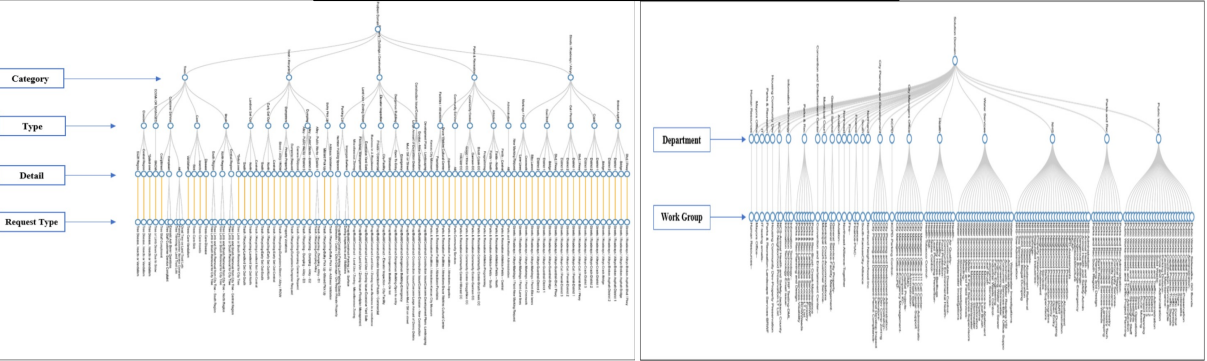
# Project Vision

## Data Integration and Visualization

## Project Vision

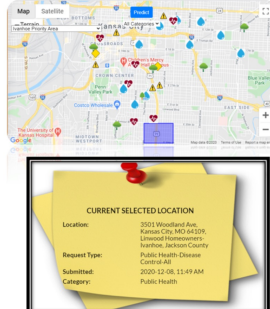


## Categorization (311 calls)



## Vision Analytics – Neighborhoods (311 calls)

311 Detection



Neighborhood Detection



### 1. Community Engagement

- Community-in-the-loop: demos/feedbacks
- Increase awareness networking & collaborations among research, government, citizen for KCMO 311 calls, census and crime data.
- Building partnership to Increase collaboration among researchers and students from multiple disciplines and across universities.

### 2. Education and Research

- Increased in capacity of education learning and research outcomes for AI and data science
  - PI training & workshops
  - PhD and MS students training
- Increased institutional engagement: Hackathons

### 3. SCC Cyberinfrastructure

- **Data Open Platform: Data sharing, Services, Apps**
  - Increased access to data tools/services
  - Improved 311 call services and visualization
  - Share and integrate data from heterogeneous data sources such as 311 call, census, crime, land bank.
- **Computer Vision Analytics for Abandon House Detection**
  - Integration of 311 call data and Google Street Views
  - Integration of Abandon House Detection and Land Bank Data
  - Object Condition Detection using Deep Convolutional Network
- **Dialogue management** to automate 311 calls using Natural Language Processing/ Deep Learning technologies

# Research and Activities

## Use-Inspired Research

- Housing abandonment in Kansas City has severely affected residents: ~12,000 abandoned with cost of \$10,000 each to tear down;
- Neighborhood leaders able to leverage visual analytics to determine housing at risk of abandonment to target micro interventions;
- City managers able to more accurately assess community need through an empowered coproduction arrangement.

## PG Activities

- Open data platform for integrated 311 call, census, crime, land bank data.
- Prototype development of visual analytics of google street views connected to 311 calls.
- Faculty training and Hackathons for technology innovation and broadening participants.
- Open forums with Ivanhoe community leaders/residents.
- Meetings with 311 call center representatives and building collaboration for data and service exchange
- Causality/correlation b/w 311 calls and abandon houses
- COVID-19 time analysis with 311 call data.
- Refinement of the open data platform for data integration and sharing.
- Refinement of the prototype with chatbot application for automated 311 calls.
- Deployment of the application prototype to the community
- Evaluation of the prototype by the community
- Dissemination of the research and technical outcomes

# Project Update

## Resources

NSF Funding

UMKC Institute of Data Education, Analytics and Science (IDEAS)

UMKC dSAIC Funding

UMKC Funding for Excellence (FFE)

## Activities

### Education and Training

- Hackathons
- Faculty and Graduate Students Training & Workshops, Weekly Meetings

### Community Outreach & City Collaboration

- Ivanhoe Neighborhoods
- KCMO 311 call center
- Mid-America Regional Council and KC Digital Drive

### Research and Dissemination

- Data Open Platform: 311 calls in KCMO, Census data, Crime data, Land bank data
- Chatbot App for 311 call
- Deep Learning-based Analytics for abandon house detection with Google Street Views
- COVID-19 Timeseries Analytics
- Causality correlation between 311 Call's property violations, abandon houses, and crimes.

## Outcomes

### Education and Research

- Increased in capacity of education learning and research outcomes for AI/data science
- Increased institutional engagement.

### Data sharing, services, cyberinfrastructure

- Increased access to data tools/services.
- Improved national data research infrastructure, content, and capacity.

### Partnerships and Collaborations

- Increased focus and research on neighborhoods/communities
- Accelerated innovation in the community data science ecosystem.

### Community Engagement

- Community-in-the-loop: demos and feedbacks.
- Increased research collaborations across discipline for the big data/AI technologies with KCMO 311 calls and census data, crime data.
- Increased awareness, networking & collaboration among neighborhood, government and researchers.

## Impact

- **Increase the capacity** for AI/data science research and education
- **Facilitate the sharing of data, services, cyberinfrastructure,** and other resources for smart connect communities
- **Community engagement** to connect and mobilize the KCMO community
- **Built impactful partnerships and collaborations** among academia, city, and community.



# Project Evolution

We discovered the significant challenges in solving real-world data problems from KCMO 311 calls and neighborhood data and learned from our focus group meetings:

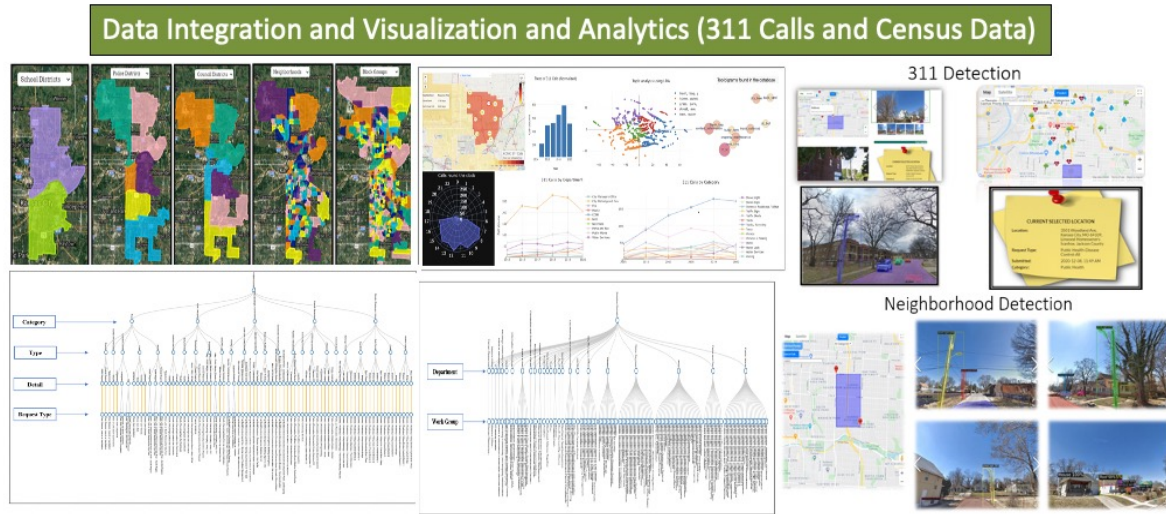
- 1) **Highly diverse data sources and existing models**, i.e., heterogeneous data are not semantically integrated. Therefore, model development becomes challenging.
- 2) **Real-time Visual Analytics with 311 Data for Abandonment Prediction**: We have found that Google Street view has limited value in predicting abandonment due to aged pictures. That would open the door to our cameras and other innovations to monitor in real-time.
- 3) **Empathetic AI and dialogue management system**.
  - a) a one-stop-shop for community issues;
  - b) calls during after-hours;
  - c) follow-up messages to update on solving the problem;
  - d) intuitive visual chatting.

We need to highlight the roles of communication mediators, who have first-hand experiential knowledge of the neighborhoods. Instead of a data dashboard for the general public, we need to project an open data platform (speech and visual interfaces) that is designed with differential privacy and access for communication mediators, opinion leaders, and change agents.

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## Visual Schematic



## Project Vision

- 1. Community Engagement:** Community-in-the-loop, Increase awareness networking & collaborations among research, government, citizens (KCMO), Building partnership across disciplines/campuses.
- 2. Education and Research:** Increase in capacity of education learning and research outcomes for AI and data science; Increased institutional engagement.
- 3. SCC Cyberinfrastructure:** (1) Data open platform for sharing data services, apps (2) Computer Vision Analytics for detecting abandon houses/places through connecting 311 calls. (3) Dialogue management for automated 311 calls.

## Use-Inspired Research

- 1) Housing abandonment in Kansas City has severely affected residents: ~12,000 abandoned with cost of \$10,000 each to tear down;
- 2) Ivanhoe neighborhood leaders able to leverage visual analytics to determine housing at risk of abandonment to target micro interventions;
- 3) KCMO City managers able to more accurately assess community need through an empowered coproduction arrangement.

## PG Activities

- 1. Education and Training:** Hackathons, Faculty and Graduate Students Training & Workshops, Weekly meetings.
- 2. Community Outreach and City Collaboration:** Focus group meetings with Ivanhoe neighborhood and KCMO 311 call center.
- 3. Research and Dissemination:** (1) Data Open Platform: Data integration of 311 calls in KCMO, Census data, Crime data, Land bank data (2) Chatbot App for automated 311 calls (3) Computer Vision Analytics for abandon house detection using Google Street Views & Deep Learning (4) Machine Learning for Timeseries Analytics.