Monitor systems in smart cities
- Monitor real-time city states
- Check the alignment between requirements and city states
- Support decision-making

Challenges
- Significant language difference: English vs Formal Language
  - Damerau-Levenshtein distance: 67 > English-Latin
- Missing & inaccurate information
  - 27.6% missing proper locations

City Policy Makers

CitySpec

Requirements
Monitoring System

Requirement:
The air quality within 100 meters of a park should always be better than 50.

Fig.1 How CitySpec helps city policy makers work with monitoring systems

Contributions
- Deploy CitySpec, the first intelligent system for requirement specification, using a user-friendly interface
- Implement a translation model to convert English requirements to formal specifications
- Apply novel online learning techniques to allow the system to learn continuously

System Overview

City Requirement Specification

Entity: creator:location, entity: condition, property: temporary

Fig.2 System design of CitySpec

Key components:
- Conversation Interface
  - Interactive completion
  - Human-in-the-loop correction
- Translation Model
  - Conversion from English to Formal language
- Requirement Synthesis
  - Introduces more knowledge from limited data source
- Online Learning
  - A solution to learn continuously

Demonstration of key features

Interactive Completion
- Back-and-forth conversation-based interaction
- User confirmation is always needed before final report

Human-in-the-loop Correction
- Detect, report, and correct requirements with user clarification

Online Learning
- Short-term learning: temporary but fast reactions to unknown or unsure domains
- Long-term learning: permanent knowledge to memorize unknown or unsure domains after validation

Insights & Future work
- CitySpec bridges the gap between city policy makers and the monitoring systems.
- CitySpec can support policy makers accurately writing and refining their requirements.
- Online Learning grants CitySpec the ability to learn effectively and continuously
- Future development: Ongoing collaboration with Nashville and Newark city offices

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