

Emergency Response Multi-Agent System

Design Presentation

Team Name

November 2, 2024

Outline

- 1 Introduction
- 2 City Selection
- 3 Environment
- 4 Tools
- 5 Agent Crews
 - Emergency Services
 - Firefighters
 - Medical Services
 - Forensics Team
 - Public Communications

Introduction

- Multi-agent system for fire-related emergencies in Lloret de Mar
- Five specialized response teams using CrewAI:
 - Emergency services
 - Medical services
 - Firefighters
 - Public communications
 - Forensics team

City Selection Process

- Selection criteria
- Candidate cities
- Evaluation metrics

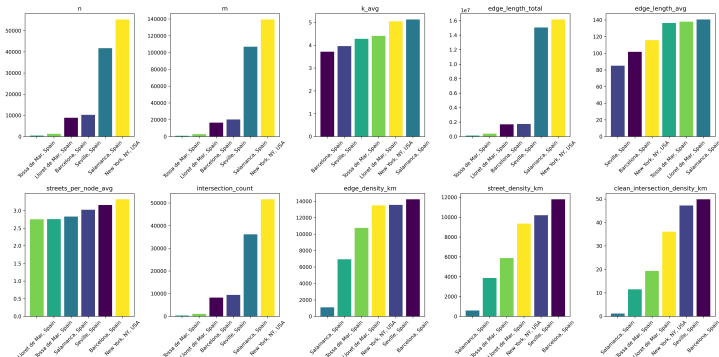


Figure: Statistics of map complexity of candidate cities

City Selection

Final selection: **Lloret de Mar**

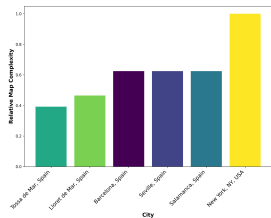


Figure: Relative map complexity



Environment Properties

- Accessibility: Partially Observable
- Determinism: Non-deterministic
- Episodicity: Non-episodic
- Dynamics: Dynamic
- Continuity: Continuous

Agent Tools

- Communication Channel:
 - Enables **communication** between crews.
 - Each crew has a **facilitator** agent with access to it.
- Database Management:
 - Grants access to **persistent** data.
 - **Information** agents can read and update databases.
 - Other agents may query to **specialized knowledge** bases.
- GPS:
 - Provides use of the map for **routing** and **distance calculation**.

Agent Crews Overview

Five specialized teams:

- 1 Emergency Services
- 2 Firefighters
- 3 Medical Services
- 4 Forensics Team
- 5 Public Communications

Emergency Services

- **Emergency Call Agent:**
 - **Interface** agent.
 - Receive and assess emergency calls.
- **Notification Agent:**
 - **Facilitator** agent.
 - Relay information to **other agent crews**.

Firefighters

- **Fire Chief:**

- **Facilitator** agent.
- **Relays info** between the emergency operator and the crew at the scene.

- **Equipment Technician:**

- **Information** agent.
- Selects and **manages** necessary **equipment** to combat the fire.

- **Fire Combatant:**

- **Collaborative** agent.
- **Assess** the situation, and **coordinate** on the best strategy to extinguish the fire.

Medical Services

- **Medical Services Operator:**

- **Facilitator** agent.
- Capable of **communicating** with other crews.

- **Hospital Coordinator:**

- **Information** agent.
- In charge of **managing** hospital **resources**.

- **Paramedic Teams:**

- **Collaborative** agent.
- Deployed in **teams** to aid at the emergency site.

Forensics Team

- **Forensics Operator:**
 - **Facilitator** agent.
 - Capable of **communicating** with other crews.
- **Forensics Coordinator:**
 - **Information** agent with access to a **database**.
 - Manages resources and information for the forensics team.
- **Coroner:**
 - **Collaborative** agent.
 - Determines the cause of death.
- **Investigator:**
 - **Collaborative** agent.
 - Investigates the cause of the fire.

Public Communications

- **Communications Operator:**
 - **Facilitator** agent.
 - Capable of **communicating** with other crews.
- **Archive Keeper:**
 - **Information** agent.
 - **Stores** and **retrieves** incidents.
- **Article Writer:** Drafts and refines public announcements.
- **Mayor:** Approves and aligns communications with city standards.
- **Social Media Commentator:** Engages the public with morale-boosting commentary of the articles.

References

- Wooldridge, Michael. An Introduction to MultiAgent Systems. 2nd ed., John Wiley & Sons, 2009. ISBN 978-0-470-51946-2.
- Wooldridge, Michael. "Properties of Intelligent Autonomous Agents." YouTube, 26 Feb. 2010,
https://www.youtube.com/watch?v=vID-_uIfAvg.