**Building AI for Urban Policy Negotiation: Funding Trade-Offs Between Law Enforcement and Homeless Services in Los Angeles**

**Introduction**

Homelessness is a pressing issue in many cities, and Los Angeles is no exception. With a limited budget, policymakers must make tough decisions about allocating funds between **law enforcement and homelessness services**. Today, we began developing an **AI-powered negotiation model** to simulate these funding trade-offs and explore data-driven decision-making.

In this article, we outline the first step in this journey: **data collection and integration**—laying the foundation for our AI system to make meaningful policy recommendations.

**Step 1: Data Collection & Integration**

Before building the AI model, we needed **real-world budget data and homelessness statistics** to guide the system's decision-making process. Here’s how we approached it:

**1. Collecting the Budget Data**

We identified **funding sources and allocations** related to law enforcement and homelessness services from multiple sources:

✅ **Los Angeles City Budget 2024**

* **Law Enforcement:** LAPD’s total budget (~$1.98B) and Investigation & Enforcement ($6.8M).
* **Homelessness Services:** Various shelter and housing programs, including:
  + Accessible Housing Program ($9.3M)
  + Accessible Housing Fund ($38.5M)
  + Affordable Housing Trust Fund ($12.8M)
  + Housing Opportunities for Persons With AIDS ($386K)
  + Inside Safe Program ($185M)
  + LAHSA Homeless Services (~$950M)

✅ **HUD Exchange Grants**

* Federal grants awarded to LA for homelessness services.
* Includes programs such as **Continuum of Care (CoC), Emergency Solutions Grants (ESG), and Housing Assistance.**

✅ **LAHSA (Los Angeles Homeless Services Authority) Budget**

* Funding breakdown for **shelters, housing programs, and outreach services.**
* Extracted from **FY 2023 HUD Budget Chart**.

✅ **Homelessness Statistics by Region**

* The **number of sheltered and unsheltered individuals per region** in Los Angeles.
* Allows AI to allocate resources dynamically based on **geographical needs**.

**2. Merging and Cleaning the Data**

To ensure compatibility, we structured the data into a **consolidated dataset**:

* **Category:** Law Enforcement / Shelter & Housing / Federal Grants
* **Program Name & Funding Source**
* **Budget Allocation ($USD)**
* **Geographical Data (Homeless Population by Region)**

This structured dataset will be **the foundation for AI-driven policy negotiations.**

**Step 2: Defining the AI Negotiation Model**

Now that we have a clean dataset, we’re ready to build an **AI-powered negotiation model** that will simulate funding discussions between different stakeholders. Here’s what’s next:

✅ **Define AI Agents & Their Objectives**

* **City Government AI:** Balance budgets and ensure political feasibility.
* **Law Enforcement AI:** Secure funding for policing while addressing homelessness.
* **Shelter Services AI:** Advocate for increased funding for shelters and outreach.
* **Resident AI:** Represent public concerns (crime rates, housing availability, tax burden).

✅ **Integrate AI Decision-Making**

* **LLM-powered argumentation** using **Meta's Llama model**.
* **Multi-Agent RL simulation** using **PettingZoo & Ray RLib**.
* **Budget trade-off modeling** with policy constraints.

✅ **Incorporate Geographical Needs**

* **Regions with high homelessness density get priority** in funding allocation.
* **No region will be left without policing or shelter services**, but **focus areas can shift dynamically**.

**Step 3: Implementing the Multi-Agent System**

After defining the AI negotiation framework, we proceeded with building the **multi-agent system** using **PettingZoo**.

✅ **Developed a PettingZoo-based multi-agent environment**

* Defined four agents: **City Government AI, Law Enforcement AI, Shelter Services AI, and Residents AI.**
* Established an **action space** where each agent proposes budget allocations for policing and shelters.
* Designed an **observation space** where agents receive data about homelessness rates and funding levels.

✅ **Implemented Reward Functions**

* **Law Enforcement AI** is rewarded for securing a higher police budget.
* **Shelter Services AI** is rewarded for increasing shelter funding.
* **City Government AI** is rewarded for keeping funding allocations balanced.
* **Residents AI** now prefers policies that **reduce homelessness**, rather than just balancing funds.

✅ **Introduced Dynamic Homelessness Modeling**

* Shelter funding **reduces homelessness at a higher rate**.
* Policing funding **reduces visible homelessness but has a lesser effect overall**.
* Homelessness rate updates dynamically based on funding decisions.

✅ **Tested and Debugged the Environment**

* Fixed initialization errors related to num\_agents in ParallelEnv.
* Ensured that **agents can take actions and observe changes in funding allocations.**
* Successfully tested initial negotiation dynamics.