**Project Development Phase**

**Model Performance Test**

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| Date | 10 February 2025 |
| Team ID | LTVIP2025TMID35761 |
| Project Name | Sustainable smart city assistant using IBM granite LLM |
| Maximum Marks | 10 Marks |

**Model Performance Testing:**

**Model Performance Testing Template**

| **S.No.** | **Parameter** | **Values (to fill)** | **Screenshot** |
| --- | --- | --- | --- |
| 1 | **Metrics** | **Regression Model**:<br>MAE – \_\_\_\_ , MSE – \_\_\_\_ , RMSE – \_\_\_\_ , R² score – \_\_\_\_<br><br>**Classification Model**:<br>Confusion Matrix – \_\_\_\_ , Accuracy Score – \_\_\_\_ , Classification Report – \_\_\_\_ |  |
| 2 | **Tune the Model** | **Hyperparameter Tuning** – (e.g., grid search parameters: learning rate, batch size, #trees)<br>**Validation Method** – (e.g., k‑fold CV, hold‑out validation with \_\_% test split) |  |

**✅ Adapting for Sustainable Smart City Assistant (IBM Granite LLM)**

Since this assistant uses IBM Granite LLM, a foundation model tuned for sustainability and smart urban management tasks, ensure that the **“Values”** section includes:

* **RAG-augmented tasks** (e.g., retrieving real-time energy consumption data, local waste metrics).
* **Text generation metrics** if using Granite for synthesizing plans or reports.

**Suggested Additions:**

* **Relevance Score** (for RAG outputs) – e.g., precision@k, recall@k.
* **Perplexity or BLEU Score** (if comparing generated responses to ground truth).
* **User Satisfaction** – mean ratings from citizen or policymaker feedback (~1–5).

**️ Example of Filled-Out Template**

| **S.No.** | **Parameter** | **Values** |
| --- | --- | --- |
| 1 | **Metrics** | **Regression (e.g., energy use prediction):**<br>MAE – 3.2 MWh, MSE – 18.4, RMSE – 4.29 MWh, R² – 0.87<br><br>**Classification (e.g., service request triage):**<br>Confusion Matrix – [[45, 5],[8, 42]] , Accuracy – 0.885 , Classification Report – (precision/recall/F1 for each class) |
| 2 | **Tune the Model** | **Hyperparameter Tuning:** grid search over learning\_rate {1e-3, 1e-4}, batch\_size {16,32}, #epochs {5,10}<br>**Validation:** 5‑fold cross‑validation on temporal split; 80/20 train/test hold‑out for final eval |

**ℹ️ Why Granite LLM?**

IBM Granite (e.g., 3.0–3.2) — especially its Instruct and Guardian variants — offers:

* **Instruction‑tuned, enterprise-ready performance**, ideal for generating sustainability plans or handling citizen queries [ibm.com+4github.com+4newsroom.ibm.com+4](https://github.com/KanukaVinay/sustainable-smart-city-ai-assistant?utm_source=chatgpt.com)[forbes.com+1reddit.com+1](https://www.forbes.com/sites/stevemcdowell/2024/10/23/ibm-granite-30-practical-open-source-llm-for-enterprise-applications/?utm_source=chatgpt.com)[eetimes.com+11ibm.com+11forbes.com+11](https://www.ibm.com/new/ibm-granite-3-0-open-state-of-the-art-enterprise-models?utm_source=chatgpt.com).
* **Robust RAG capabilities**, enabling retrieval of real‑time or external data when crafting assistant responses .
* **Reasoning support** via chain‑of‑thought models (Granite 3.2) to explain decisions or plans transparently [ibm.com+2reddit.com+2reddit.com+2](https://www.reddit.com/r/LocalLLaMA/comments/1il6x8c?utm_source=chatgpt.com).