Ecopolis

AI-Driven Urban Biodiversity Planner

Problem Statement

Increasing Urbanization is threatening local biodiversity.

Why should we care about biodiversity ?

$44 trillion

Economic value generation dependent on nature

Main issue is people just does not care about the nature and keep on making new things , buildings …

How it can be solved ?

If before making a factory here

I get to know that biodiversity risk here is very high then

2 possible options are there

Change the Factory location

Do something to Compensate construction

What our model does ?

- Gives the biodiversity risk score
- Solution to improve the biodiversity of that region
- Implements techniques like chain of thought prompting and self-reflection to generate most relevant solutions and reasoning

Why trust the model ?

Ensemble of models

```
LightGBM Metrics:
RMSE: 0.0206
R2 Score: 0.9884

XGBoost Metrics:
RMSE: 0.0180
R2 Score: 0.9912

CatBoost Metrics:
RMSE: 0.0211
R2 Score: 0.9879

Ensemble Model Evaluation:
==================================================

Weighted Ensemble Metrics:
RMSE: 0.0185
R2 Score: 0.9907
```

Provided a detailed explanation for why the risk score is set at that level.

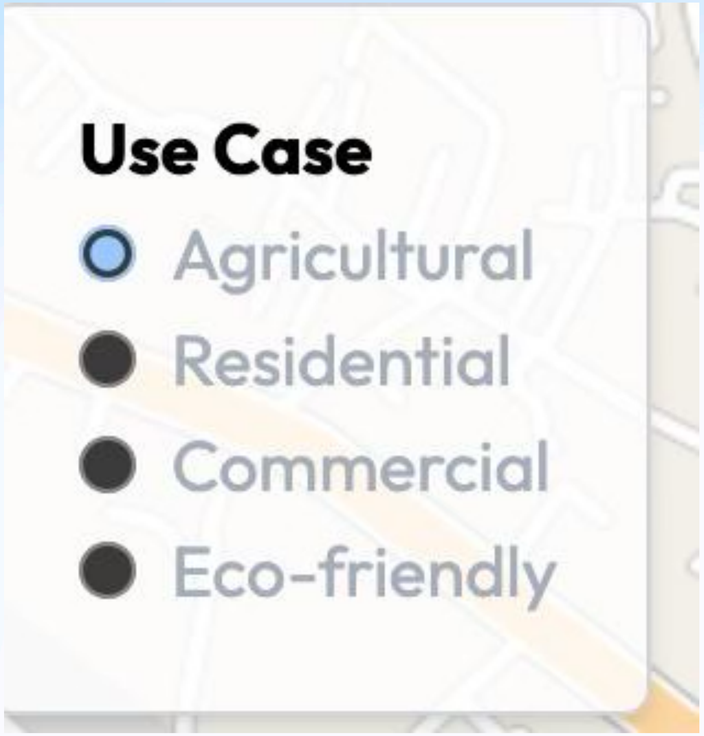
eg:-

The medium risk score of 0.38 is influenced by high agricultural intensification, habitat fragmentation, and declining native species richness. The SHAP analysis reveals that agricultural development (0.15) and monoculture practices (0.12) significantly heighten risk by reducing habitat diversity, while water pollution (0.11) exacerbates the issue by impacting aquatic ecosystems. These features interact negatively, amplifying the overall biodiversity threat in the region.

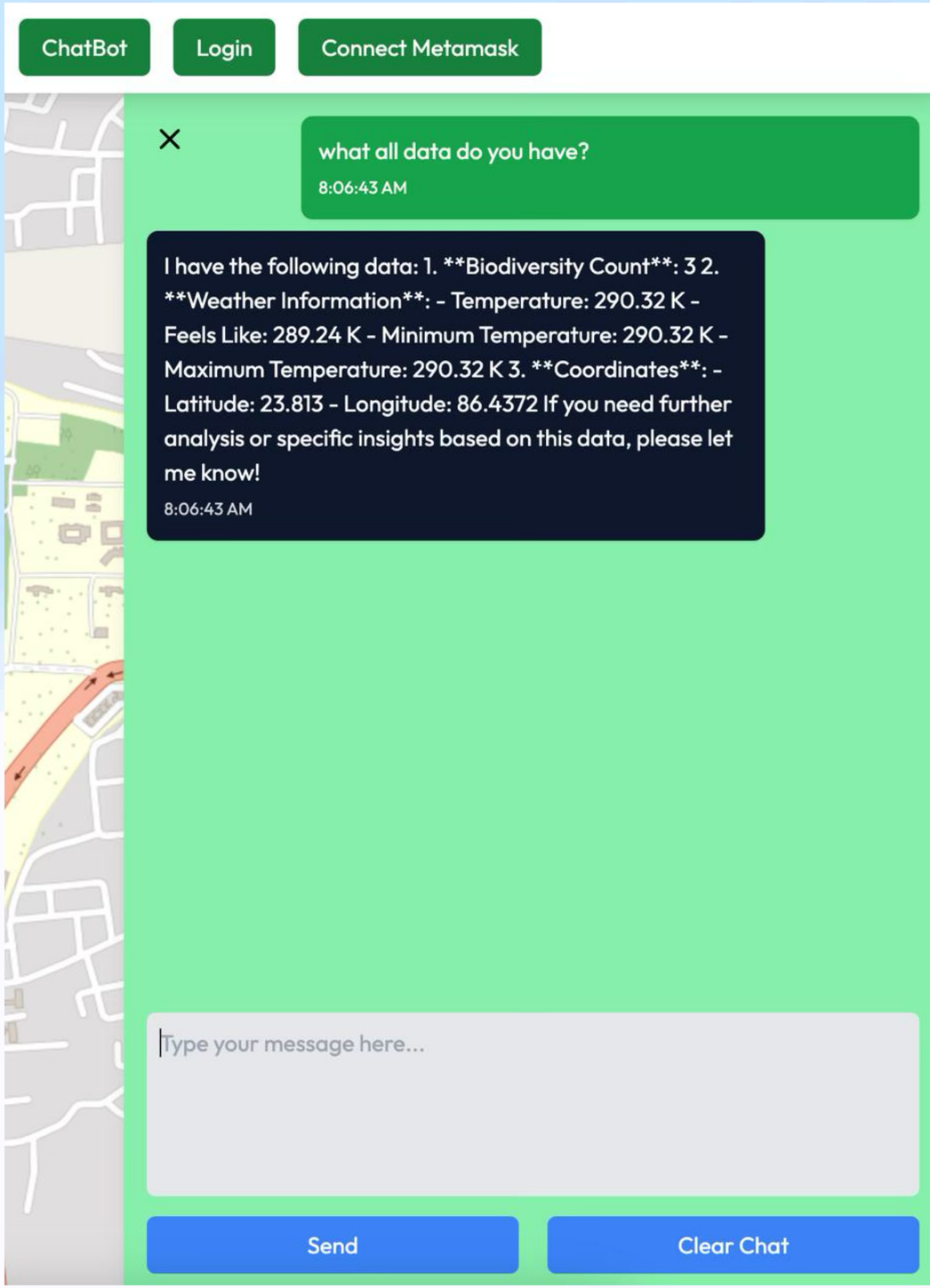
used SHAP values to understand why the model made a specific prediction

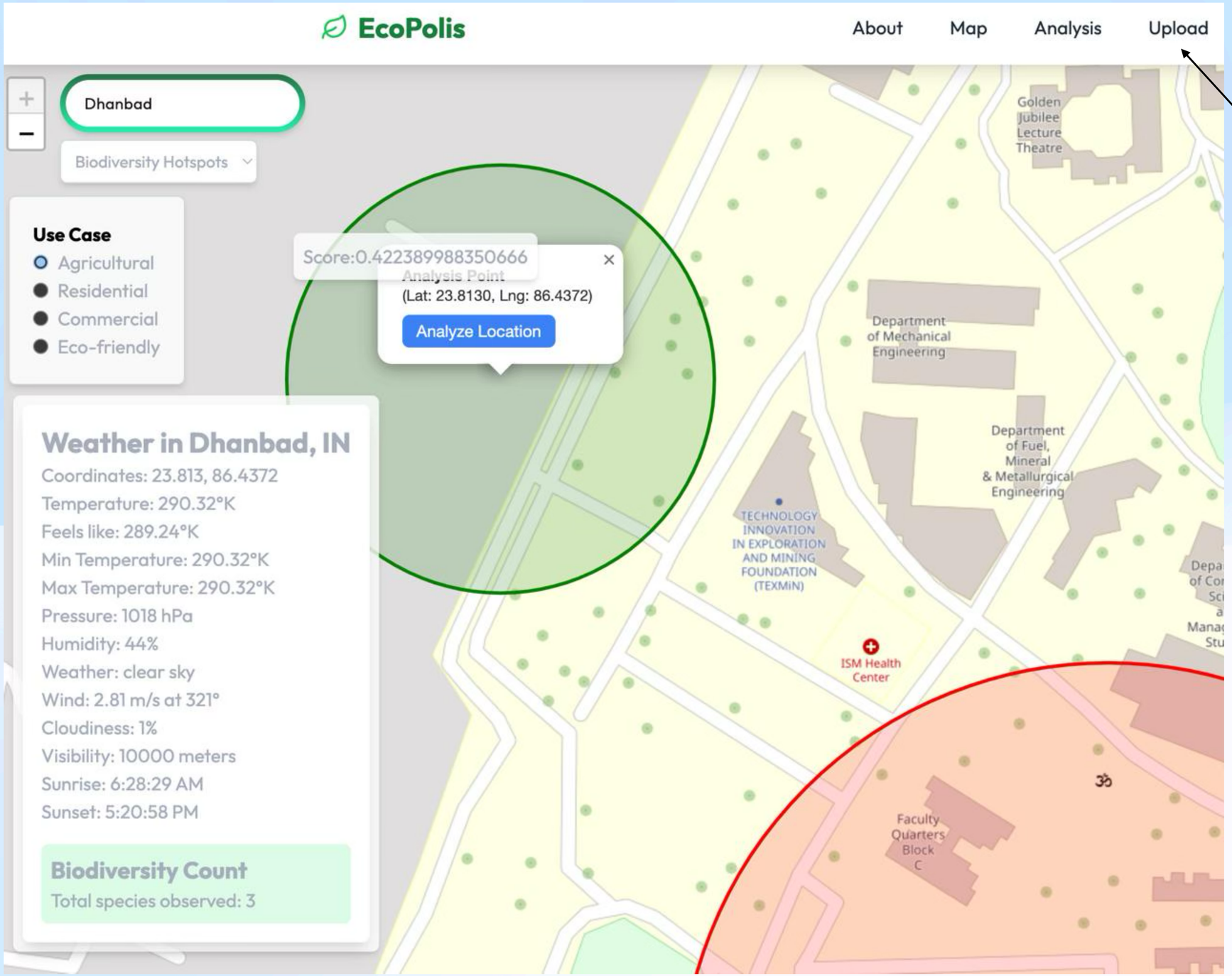
Uniqueness

We just do not give the same risk score for all the use cases , we consider the most possible use cases and trained our model like that



Instead of just providing the solution to decrease the risk score we gave recommendations dynamically based on user inputs, such as urban expansion plans or specific biodiversity goals.





You can upload your own GIS files instead of global map

Uniqueness

Robust features : -

```
categorical_feature = ['land_use_type']
numerical_features = ['latitude', 'longitude', 'temperature', 'precipitation',
                      'ndvi', 'urban_land_usage', 'water_coverage','humidity',
                       'species_richness']

```