Bytexl's Guided Project:

Project Overview:

The project, "AI Based Urban Planning," This project Aims for AI-based urban planning offers a transformative approach to reimagine urban living, aiming to create smarter, more efficient cities that enhance quality of life.

Prerequisites

- Knowledge of Urban Planning: Understanding of zoning, land use, and urban design principles.
- GIS Proficiency: Familiarity with Geographic Information Systems (GIS) for spatial analysis and mapping.
- Machine Learning & Deep Learning: Basic skills in image processing and model development, preferably using TensorFlow.
- Python Programming: Fundamental coding skills in Python, with experience in libraries like Pandas , Ploty and Matplotlib.
- Data Analysis: Ability to manipulate and visualize urban data effectively.

Learning Outcomes:

1. GIS Skills: You will learn to use Geographic Information Systems (GIS) for spatial analysis and urban modeling.

2. Understanding Urban Planning: You will learn key principles of urban planning and the role of AI in addressing urban challenges

3. Data Analysis Proficiency: You will develop the ability to analyze and visualize urban data, enabling informed decision-making in planning processes.

4. Machine Learning Basics: You will acquire foundational skills in machine learning and deep learning, including GIS techniques relevant to urban studies.

5. Python Programming: You will enhance your Python coding skills, focusing on libraries essential for data analysis and machine learning.

Skills Practiced:

- AI Based Urban Planning Prediction
- Data Collection and Cleaning(EDA)
- Feature Engineering
- Model Building Using Gradient Descent
- Streamlit Application

Course Structure:

1.Introduction and Course Overview

This course explores the integration of artificial intelligence in urban planning, focusing on data-driven decision-making to address urban challenges. Participants will engage in hands-on tasks, including data collection, exploratory data analysis, model building using Random Forest, and the development of interactive applications with Streamlit. By the end of the course, participants will be equipped with the skills to apply AI techniques in urban planning contexts.

2.Project Structure

Task 1: Introduction to Urban Planning

Read foundational materials on urban planning principles.
Write a brief overview of current urban challenges in your community.

Task 2: Data Collection

Identify and gather relevant urban datasets (e.g., population density, transportation, land use).
Document your data sources and any relevant metadata.

Task 3: Exploratory Data Analysis (EDA)

Conduct EDA on your dataset using Python libraries (e.g., Pandas, Matplotlib, Seaborn).
Summarize key findings and visualizations from your EDA.

Task 4: Model Building

Learn the basics of the Random Forest algorithm and its applications in urban planning.
Build a Random Forest model using your dataset to make predictions (e.g., predicting urban growth).

Task 5: Model Evaluation

Evaluate the performance of your Random Forest model using appropriate metrics (e.g., accuracy, F1 score).
Fine-tune the model by adjusting parameters and improving performance.

Module 6: Application Development

Develop a web application using Streamlit to showcase your model and findings.
Create interactive visualizations and features that allow users to explore the data and model outputs

Execution on Learning Platform

- Use VS-code In your Local System
- Nimbus –Python on Bytexl
- Nimbus-Jupiter Notebook
- For GPU Use Google Colab

Educator Instructions:

1.Scenario Development:

Craft practical scenarios for students to explore, such as assessing traffic flow in particular urban areas or analyzing the influence of parks on local communities.

2.Student Guidance:

Introduction Message: Kick off the course with a welcoming note that outlines the course goals and highlights the significance of integrating AI into urban planning.

Data Gathering Instructions:
Provide clear directions on how to find and collect relevant urban datasets, helping students understand the importance of their chosen sources.

Exploratory Data Analysis (EDA):
Walk students through the EDA process, encouraging them to utilize various visualization methods and think critically about their findings.

Model Development Assistance:
Offer detailed steps for constructing and evaluating a Random Forest model, ensuring that students grasp each component of the modeling process.

Interpreting Results:
Support students in making sense of their analysis outcomes, guiding them on how to articulate their findings and compile thorough reports.

Application Creation:
Provide structured instructions for building their Streamlit application, emphasizing effective user experience design and interactive elements.

Objectives Summary:

The AI Urban Planning course equips participants with skills to integrate AI into urban planning. It covers urban planning principles, data collection and analysis, exploratory data analysis (EDA), building Random Forest models, and developing interactive applications with Streamlit. By the end, participants will be prepared to effectively apply AI techniques in urban planning contexts.