For my project on "Machine Learning Applications in Urban Road Data Mining," I have given considerable consideration to the techniques and skills that align best with my goals.

1. Research Method

Considering the technical and human aspects of my subject, a mixed methods approach is the most suitable. The quantitative aspect will enable me to work on large urban traffic datasets and train models to find useful patterns (Sage, 2021). On the qualitative aspect, I will explore ethical problems, model interpretability, and feedback from stakeholders—essential for real-world applications (BRM, n.d.; Floridi et al., 2018).

2. Data Collection

For primary data useful for real-time analysis, I will consider data from sensors, cameras, GPS devices, IOT infrastructure and smart infrastructure traffic records. To benchmark and validate data, I plan to use open datasets from the UCI Machine Learning Repository and published studies. (UCI, n.d.; Kumar & Toshniwal, 2015).

3. Skills Needed

To carry out this project, I will build on a range of tools and approaches:

- Machine learning methods:
    - Supervised learning dominance (LightGBM, Random Forests)
    - Deep learning adoption (CNNs, RNNs)
    - Unsupervised clustering approaches
- Data sources diversity and geographical bias
    - Challenges: data quality, interpretability, temporal dynamics
    - Future direction: cross-domain integration

Using these approaches and tools, I hope to generate workable insights encouraging improved urban transport systems.

References

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