Tourism AI Project Guidelines

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Course: AI and Tourism – MIT-AI @ Gandaki University

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Welcome to Your AI Tourism Project!

Course Context
This elective course bridges AI theory with practical tourism applications. Your project is the capstone experience!

Purpose of These Guidelines
To help you design, develop, and present a meaningful AI project that solves real tourism challenges.

- Apply theoretical concepts to practical problems
- Build your AI portfolio
- Contribute to sustainable tourism development

Project Objectives

1. **Solve** a real or simulated tourism-related problem using AI techniques
2. **Demonstrate** understanding of course concepts:
   - Data preprocessing
   - Machine Learning & NLP
   - Recommendation systems
   - Geospatial analytics
   - Sustainable tourism
3. **Produce** actionable insights, a prototype, or decision-support model
4. **Link** project outcomes to SDGs and sustainable tourism
5. **Demonstrate** ethical AI use in tourism contexts

Suggested Project Themes

Theme	Possible Project Ideas
Tourist Behavior Analysis	Predict tourist arrivals, classify tourist types, analyze spending patterns using historical data
Sentiment & Opinion Mining	Analyze TripAdvisor/Booking.com reviews using NLP to gauge satisfaction
AI-Powered Recommendation Systems	Build hybrid recommender for destinations, hotels, or activities

Suggested Project Themes

Theme	Possible Project Ideas
Geospatial Analytics for Tourism	Use GPS/mobile data to track movements, identify hotspots, optimize routes
Sustainable Tourism Monitoring	Measure environmental/social impact (overcrowding, carbon footprint)
Smart Destination Management	Create real-time dashboard using APIs (Google Maps, social media)

Theme 1: Spatial Mapping of Tourism

Topic	Real-time visitor flow monitoring & POI clustering
Objectives	**Gap:** DMOs lack real-time systems for over-tourism prevention **Contribution:** Identify dynamic tourist POIs for capacity planning
Data Source	Geo-tagged UGC (Flickr, mobile data) in urban areas
Methodology	Unsupervised clustering (DBSCAN) for POI detection
Validation	Visual validation; cluster robustness metrics
References	Devkota et al. (2019); Gossling et al. (2025)

Theme 2: Customer Acquisition Strategy

Topic	Predictive modeling for customer booking likelihood
Objectives	**Gap:** Underdeveloped digital marketing & revenue management **Contribution:** Prioritize potential customers by predicting conversion probability
Data Source	Historical user profiles from web tracking (sessions, page views, product history)
Methodology	Supervised classification/regression (Random Forest, Gradient Boosting, SVM)
Validation	Hold-out test set; Accuracy, Balanced Accuracy, F1-Score, AUC
References	Nunez et al. (2024); Egger (2023)

Theme 3: Customer Experience & Sentiment

Topic	Topic modeling & sentiment analysis of tourism reviews
Objectives	**Gap:** Poor semantic insight from short-text reviews **Contribution:** Extract interpretable topics & sentiment for service improvement
Data Source	TripAdvisor, Yelp, Airbnb reviews
Methodology	LDA/NMF + VADER/SentiWordNet
Validation	Topic coherence; qualitative review; sentiment F1-Score
References	Zafarani et al. (2014); Lahagun et al. (2024)

Theme 4: Demand Forecasting

Topic	Combined forecasting for tourist arrivals
Objectives	**Gap:** Over-reliance on traditional data; volatile environments **Contribution:** Show combined models improve accuracy over single models
Data Source	Historical arrival data (monthly/quarterly)
Methodology	Combined forecasting (ETS, Seasonal Naïve,...)
Validation	Out-of-sample MAPE, RMSE comparison
References	Peeters et al. (2024); Springer (2025)

Theme 5: Explainable AI in Tourism

Topic	Explainable AI for tourism predictive models
Objectives	**Gap:** Black-box ML models lack transparency **Contribution:** Provide interpretable insights for decision-makers
Data Source	Labeled tourism dataset (e.g., hotel cancellations)
Methodology	SHAP/LIME on Random Forest/XGBoost
Validation	SHAP summary/force plots; alignment with domain theory
References	IGI Global (2024); Asif et al. (2023)

Project Development Steps

1. **Problem Definition & Literature Review**
   - Clearly define tourism problem
   - Review a minimum of 2-3 GOOD research papers
2. **Data Collection & Preprocessing**
   - Identify sources: APIs, public datasets
   - Clean, normalize, engineer features
3. **Methodology Selection**
   - Choose appropriate AI/ML techniques and justify the choices
4. **Implementation (Python/R...)**
   - Use libraries: Pandas, Scikit-learn, NLTK, GeoPandas, ...
5. **Evaluation & Interpretation**
   - Use relevant metrics
   - Interpret in tourism context
6. **Reporting & Presentation**
   - 5-10 page report
   - GitHub repository optional

Recommended Tools & Technologies

Programming
- Python (preferred)
- R

Libraries
- Pandas, NumPy
- Scikit-learn
- NLTK, SpaCy
- GeoPandas
- Matplotlib, Seaborn

APIs
- Google Maps
- OpenStreetMap
- TripAdvisor/Twitter

Platforms
- Jupyter Notebook
- Google Colab
- GitHub

Data Sources
- Kaggle
- UNWTO
- Airbnb Open Data
- VGI platforms

Evaluation Criteria

Technical Assessment
- Problem relevance to tourism
- AI method appropriateness
- Data processing quality
- Model implementation
- Results validation
- Project Documentation

Bonus Points
- GitHub repository
- SDG alignment
- Creative visualization

Suggested Timeline

Weeks	Tasks
1–2	**Topic & Literature Review**: Finalize theme, review papers, define problem
3–4	**Data Preprocessing & EDA**: Source data, clean, explore, visualize
5–6	**Model Development**: Implement chosen methodology, train/test models
7	**Results & Visualization**: Interpret results, create visualizations
8	**Report & Presentation**: Write final report, prepare presentation

Suggested Timeline

Key Dates
- Week 2: Topic proposal due
- Week 4: Data analysis checkpoint
- Week 6: Model review session
- Week 8: Final presentation & report submission

Integration with Course Content

Link to Course Units
- **Unit 3 (ML & NLP)**: Use for predictive or sentiment analysis projects
- **Unit 6 (Geospatial Analytics)**: Apply for mapping and movement analysis
- **Unit 7 (Sustainable Tourism)**: Link project with SDGs
- **Unit 8 (Ethics)**: Reflect on responsible AI use in tourism

Recommended Resources
- Course books from syllabus
- Research articles
- Online tutorials (Coursera, Kaggle,...)
- Lab sessions & class hours

Ready to Begin Your AI Tourism Journey?

Your Checklist:

1. **Choose** a theme that excites you
2. **Start** early and iterate often
3. **Link** tech to tourism impact
4. **Document** everything
5. **Present** with clarity & confidence