AI Bootcamp: A Project-Based Journey from Data to Insights Using LLMs

Instructor Information

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Course Description: This hands-on, project-based course is designed for graduate students in Information Systems, Business Analytics, Finance, and Accounting. Throughout the semester, you will explore the full spectrum of AI applications—from traditional data acquisition and processing to cutting-edge generative AI and large language model (LLM) techniques. By combining classical analytical methods with modern prompt engineering, you'll learn how to transform raw data into compelling visual insights and narratives that drive real-world business decisions. The course culminates in an integrated capstone project that addresses a specific business challenge using both established and emerging AI strategies.

Course Objectives

- **Foundational Insights:**
  • Understand the evolution of AI, distinguishing between traditional analytical techniques and modern generative AI/LLMs.
- **Data Mastery:**
  • Learn effective methods for data acquisition, cleaning, and exploratory analysis using accessible, free tools.
- **Analytical Integration:**
  • Apply classical statistical methods alongside LLM-driven analysis to derive meaningful insights from data.
- **Visual & Narrative Communication:**
  • Create powerful visualizations and integrate AI-generated narratives to clearly communicate data-driven findings.
- **Prompt Engineering Expertise:**
  • Master both basic and advanced prompt engineering techniques to harness the full potential of generative AI and LLMs.
- **Capstone Development:**
  • Develop a comprehensive, end-to-end AI solution that addresses a real-world business problem.

Prerequisites

- Basic familiarity with data concepts and business analytics.

- An interest in exploring the evolving role of AI in business strategy (no extensive coding experience required).

Supplemental Readings

1. Artificial Intelligence: A Modern Approach *Stuart Russell & Peter Norvig*
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking *Foster Provost & Tom Fawcett*
3. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow *Aurélien Géron*
4. Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play *David Foster*
5. Prediction Machines: The Simple Economics of Artificial Intelligence *Ajay Agrawal, Joshua Gans, & Avi Goldfarb*

Assessment & Deliverables

Component	Percentage
Weekly Assignments & Case Studies	25%
Ethics Quiz	5%
Mid-Course Project Proposal	25%
Final Capstone Project (Report, Demo, & Presentation)	45%

Ethics Quiz Details:

- A short quiz designed to assess your understanding of ethical challenges in AI, including issues such as bias, transparency, and accountability.
- The quiz will require you to apply course concepts to realistic scenarios and will be administered online during Week 10.
- Proper preparation through class discussions and readings is essential.

Course Schedule

The course is structured as a project journey—from introductory concepts through data preparation, processing, visualization, and finally, advanced generative AI and prompt engineering. The schedule below outlines key topics and deliverables by week.

Week	Topic & Focus	Key Activities & Deliverables
1	**Introduction to AI & Business Overview**	• Overview of traditional AI vs. generative AI/LLMs • Demonstrations of free AI tools (ChatGPT, DALL-E, etc.) • Project briefing and team formation
2	**Project Setup & Defining the Business Challenge**	• Review real-world AI use cases and success stories • Brainstorm business challenges (finance, accounting, analytics) • Initial project proposal outline
3	**Data Acquisition & Cleaning**	• Methods: web scraping, public datasets, API usage • Data cleaning techniques (handling missing values and outliers) • Lab session on gathering and cleaning data
4	**Exploratory Data Analysis & LLM Augmentation**	• Conduct EDA with descriptive statistics and initial visualizations • Experiment with LLMs to generate synthetic data or initial insights • Submit data readiness report
5	**Classical Data Processing Techniques**	• Apply traditional methods (e.g., regression, clustering, or classification) • Lab session on implementing analytical models • Interim analysis report (Part 1)
6	**LLM Integration & Basic Prompt Engineering**	• Use LLMs (e.g., ChatGPT) to summarize trends and interpret outputs • Introduction to crafting basic prompts • Lab session and documentation of LLM outputs
7	**Combining Classical & LLM-Driven Analysis**	• Integrate traditional data processing with LLM-generated insights • Comparative workshop and discussion • Interim project report (methodology and insights)
8	**Data Visualization Techniques**	• Explore best practices for visualizations (charts, dashboards) • Hands-on lab with tools like Tableau Public, Power BI, or Python libraries • Draft visualizations submitted for feedback
9	**Narrative Generation**	• Apply advanced prompt engineering to generate clear, actionable narratives from visual data • Lab session on

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	with LLMs	crafting prompts for executive summaries • Submit draft narratives
10	**Integrative Dashboard Development & Ethics Quiz**	• Merge visualizations with AI-generated narratives • Develop an interactive dashboard • Peer review session and mid-final presentation of dashboard and narratives • Administer Ethics Quiz
11	**Advanced Prompt Engineering**	• Deep dive into iterative refinement, chain-of-thought prompting, and few-shot learning • Analyze case studies and troubleshoot prompt pitfalls • Submit documented prompt engineering toolkit
12	**Expanding LLM Applications**	• Use advanced prompts to generate detailed reports, forecasts, and strategic insights • Workshop on troubleshooting and optimizing LLM outputs • Enhance project outputs with optimized LLM results
13	**Final Project Integration**	• Consolidate data preparation, processing (classical & LLM-driven), visualization, and narrative components into a single project • Workshop and one-on-one feedback sessions • Submit draft final project for review
14	**Final Presentations & Reflective Discussion**	• Deliver comprehensive final presentations with live demos • Roundtable discussion on ethical considerations and lessons learned • Submit final project

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Additional Policies & Information

- **Submission Deadlines:** All assignments are due at 11:59 PM on the specified due date via Canvas.
- **Use of AI Tools:** Use of AI tools, including ChatGPT and other LLMs, is permitted provided that all AI-generated content is appropriately cited.
  • Students must include full attribution for any AI-assisted work and ensure that outputs do not contain false or misleading information.

This syllabus is designed to merge timeless business strategies with the innovative potential of modern AI. By the end of the course, you will have gained hands-on experience in data analytics, visualization, and the sophisticated use of generative AI and LLMs to drive

actionable business insights. The Ethics Quiz and increased emphasis on the mid-course project proposal will ensure you engage critically with ethical issues and integrate your learnings in a thoughtful, human-centered manner. Ready to embark on a journey where data meets innovation? Let's transform information into impactful intelligence!