S411001 - Modern Flexible Regression - Spring 2025
Prof. Eva Cantoni

ChatGPT Project

Project description

This document is a description of this group project. Additionally, the concept of the project will be introduced and discussed during the lecture of Tuesday February 25th, 2025 at 12pm15, with a specific focus on how to work in groups (with a presentation by Philippe Haeberli, pedagogical adviser).

On Tuesday March 4th, 2025, Prof. Gaëlle Molinari will introduce a UNIGE research project about the use of ChatGPT in group settings, in which you can participate on a voluntary basis. The research project of Prof. Molinari is completely independent from and has no impact on the course assessment.

Project goals

The primary goal of the project is to empower Master of Statistics students to explore the potential of ChatGPT, an advanced language model, for comprehensive data analysis. The project will involve leveraging ChatGPT's capabilities to extract insights, generate hypotheses, and derive meaningful conclusions from a given dataset. Through this exploration, students will gain hands-on experience in integrating generative artificial intelligence (gAI) into statistical analysis workflows.

The project provides an opportunity for students to bridge the gap between traditional statistical methods and emerging AI technologies, fostering a well-rounded skill set crucial for today's data-driven landscape.

Data and scientific question of interest

A dataset will be provided to each group, together with a scientific question of interest to be addressed.

Instructions

The general instruction is to analyze the provided data to answer the scientific question of interest by using ChatGPT as a digital partner playing the role of an analyst. Your task is to engage with ChatGPT critically, guiding its analysis by explicitly integrating the methodological and statistical tools covered in the course into your prompts. **The scientific question of interest has to be answered based on the provided data, with the methodological and statistical tools (models) of the course and with the R software**.

Both free and paid versions of ChatGPT are allowed, with the need to declare which version has been used. **Which version is used has no impact on the grade.**

Deliverables

Firstly, each group is expected to hand in (upload on Moodle):

- A PDF file (maximum 5 pages, minimum font size 12) that contains a **clickable link to the history of the conversation with ChatGPT** and a **critical assessment** of the analysis with ChatGPT. The assessment should address the following dimensions:
    - Scientific argumentation (maximum 1 page): Answer the scientific question by integrating ChatGPT's outputs. Your response should be supported by well-reasoned arguments, drawing on theoretical concepts and methods discussed in class.
    - Critical evaluation of ChatGPT's contributions (maximum 3 pages): Assess the relevance, strengths, and weaknesses of ChatGPT's responses. More specifically, discuss the accuracy and coherence of ChatGPT's statistical choices, the validity of the applied methodologies in relation to the course content, the robustness of the interpretations, any potential biases, errors, or inconsistencies in the generated response. Discuss also whether ChatGPT's analysis aligns with statistical and methodological best practices, and identify any limitations or inconsistencies.
    - Reflection on the collaborative use of ChatGPT (maximum 1 page): Describe how ChatGPT was used as part of the group's workflow, its benefits and limitations in the data analysis process, and its influence on collective decision-making.
- Slides for the oral presentation.

Additionally, you may include:

- R code with output if relevant and if it helps support your critique of the model proposed by ChatGPT.

Secondly, each group will present the project orally for 10 minutes followed by a discussion of 10 minutes. The discussion will be led by the students of another group, who will receive your presentation slides ahead of time.

Schedule and deadlines

The project is expected to be completed within a timeframe of about 5 weeks, allowing ample time for exploration, analysis, and documentation. We expect it to represent an average amount of work of about 25-30 hours. An example of the use of ChatGPT to analyse data will be discussed during the lab (session of Tuesday April 1st, 2025, related to Homework 5).

The following deadlines apply:

- Randomly assigned groups announcement and availability of datasets and questions (on Moodle): Friday April 4th, 2025
- Deadline to hand in the report and the presentation slides: Tuesday May 13th, 2025
- Oral presentations: Tuesday May 20th, 2025

There is the possibility for each group to ask for one appointment for intermediate feedback from the teachers during the period April 24th, 2025 - May 6th, 2025.

Learning goals:
At the end of the course, students will be able to:

- Apply statistical techniques to identify patterns and trends within the dataset.
- Formulate meaningful questions and hypotheses to properly analyze a data set
- Integrate ChatGPT into the statistical analysis process to enhance data interpretation.
- Evaluate the strengths and limitations of using AI for data-driven insights.
- Collaborate with peers to improve the overall quality of the analysis.
- Communicate findings by delivering an effective oral presentation
- Manage time and resources effectively throughout the analysis process

Assessment and grading
The evaluation of each group will be based on the effective use of ChatGPT, on the depth and rigor of the critical assessment and the clarity and persuasiveness of the oral presentation and the discussion.

The report assessment counts for 80% of the grade of the project and the oral presentation and discussion count for the 20% remaining part of it.

The 80% contribution of the report can be split as follows:

- 10% for the scientific argumentation,
- 50% for the critical assessment,
- 10% for the reflection on the collaboration, and
- 10% for the overall quality of the report.

Final grade of the course
The project contributes 30% of the final grade for this course, while the computer-based written exam during the exam session contributes 70%.