**☕ Caffeine Consumption Simulation with AI Analysis**

**Project Overview**

This project explores the effects of caffeine intake through various coffee-based beverages, analyzing how many cups a person can consume in a day without exceeding the safe daily limit of 400mg of caffeine, as recommended by health authorities.

By simulating different consumption scenarios and using artificial intelligence to interpret the data, we aim to extract insights, identify patterns, and recommend optimized coffee plans for safe daily intake.

**Experiment Scenario: How Much Coffee Can a Human Drink?**

**Objective**

To determine the maximum number of servings for different types of coffee (espresso, filtered coffee, instant coffee, energy drinks) that can be consumed daily without surpassing the 400mg caffeine threshold.

**Methodology**

* Selected 4 beverage types with known average caffeine content:
  + Espresso (63mg per shot)
  + Filtered Coffee (95mg per 240ml cup)
  + Instant Coffee (60mg per serving)
  + Energy Drink (80mg per can)
* Created simulated scenarios with various daily serving amounts
* Calculated total caffeine per scenario
* Evaluated whether each scenario was within the safe limit
* Interacted with AI using prompt engineering for deeper insights

## AI Analysis

### Prompt Engineering

We developed 12 prompts to analyze:

* Descriptive data patterns
* Linear models
* Health and safety consequences
* Optimal coffee plans

All prompt interactions and AI responses are documented in prompts\_and\_responses.md.

### Key Findings from AI

* Filtered coffee has the highest caffeine per cup (95mg)
* Instant coffee allows the most servings before hitting the 400mg limit
* A linear model predicts caffeine intake: Total = servings × caffeine per drink
* The safest multi-beverage plan is: 1 espresso + 1 filtered coffee + 1 energy drink = 238mg total

## Conclusion

This simulation demonstrates how data collection, simple math modeling, and AI prompt engineering can be combined to:

* Explore real-life consumption limits
* Generate health insights
* Optimize daily routines

It also reinforces safe caffeine practices while promoting data literacy and responsible experimentation.