

Project Introduction: First Principles Problem Solving App

Kann ... / Algorithmus x / exakt ... / (Kunden)-Problem ... berechnen oder lösen?

The developed Streamlit app leverages generative AI (OpenAI's GPT models) as a flexible “algorithm” to provide structured, stepwise analysis of complex, open-ended problems. The app helps users to break down challenges, identify assumptions, and generate new solution pathways using first principles thinking—a reasoning process often not supported by “classic” algorithms.

Data Science Core Statement (Kernaussage):

This project demonstrates how AI-guided workflows can systematize creative, analytical problem solving for users, from initial problem definition through to actionable, evidence-based solutions using first principles reasoning.

(P) Problem:

[Which question is of greatest importance to the user?]:

How can a user (or client) turn a vague, complex, or “stuck” challenge into a set of clearly structured assumptions, facts, and innovative solution concepts in a reproducible, guided fashion—without specialist training?

(I) Intervention:

[What main computation/library/algorithm do I favor?]:

- **Library:** OpenAI Python package (openai.openai), Streamlit for interactive UI.
- **Algorithm/Model:** GPT-3.5-turbo LLM for natural language reasoning and creative ideation; prompt engineering as the main “algorithmic” approach.
- **Workflow:** User interacts stepwise via forms; LLM offers original analysis and feedback at each stage.

(K) Kontrollintervention:

[What is the alternative approach?]:

- Use deterministic rules, classical decision trees, or domain-specific expert systems (e.g., scikit-learn classifiers/regressors for financial data).
- Develop a manual set of logic-based rules or deploy a static problem-solving template—without AI-driven adaptation/creativity.

(E) Ergebnismaß (Evidence/Target):

[What does the user/client aim to achieve?]:

- Obtain a structured session report:
 - AI-generated analysis of the core problem
 - Hidden assumptions surfaced and challenged
 - User-curated facts/elements
 - Multiple creative solution alternatives
- A reproducible, automatically saved step-by-step session (as a .txt file), enabling both personal reflection and organizational knowledge retention.

Notes (Anmerkungen):

- This approach is especially valuable when classic data modeling is impossible due to ill-defined variables, limited labeled data, or creative/analytical goal orientation.
- The app is intentionally “algorithm-agnostic” at its core, using AI reasoning where other algorithms cannot meaningfully operate.

References (Literaturhinweise):

- Musk, E., & Vance, A. (2015). *First Principles Thinking*.
- Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning*. MIT Press.
- OpenAI documentation: <https://platform.openai.com/docs>
- Ravindranath, K.K. (2023). “How to Apply First Principles Thinking to Solve Any Problem.” *Towards Data Science*.