**Project Description**

This project invites you to explore how different value dimension frameworks can be used to evaluate text-based design process output. The goal of this project is to invite more discourse about how different perspectives of value influence the evaluation of the design process output – particularly, at the early stages of design processes.

**What is a Value Dimension Framework?**

In this context, a value dimension framework includes a collection of statements that define metrics of success, particularly for complex problem solving efforts such as those pursued through design thinking.

**Examples of Value Dimension Frameworks**

* Maslow’s Hierarchy of Needs (Maslow, A. H., “A Theory of Human Motivation.”)
* United Nation’s Sustainable Development Goals (<https://sdgs.un.org/goals>)
* Schwartz’s Motivational Types of Values (Schwartz, S. H., 1994, “Are There Universal Aspects in the Structure and Contents of Human Values?,” Journal of Social Issues, 50(4), pp. 19–45. <https://doi.org/10.1111/j.1540-4560.1994.tb01196.x>.)
* Kiesel et al.’s Taxonomy of 54 Values (Kiesel, J., Alshomary, M., Handke, N., Cai, X., Wachsmuth, H., and Stein, B., 2022, “Identifying the Human Values behind Arguments,” *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, Association for Computational Linguistics, Dublin, Ireland, pp. 4459–4471. <https://doi.org/10.18653/v1/2022.acl-long.306>.)

Value dimension frameworks are wide ranging in their application and unit of focus. For example, some frameworks assess the individual as distinguishable entities from their community while other frameworks are concerned with varying levels of community (i.e. regional, national, and global scales of assessment). Considering the many spectrums along which value dimensions frameworks can take form – from the individual and colloquial community to formalized institutional networks and global entities – I invite you to draw inspiration from the themes below in developing your own value dimension frameworks:

* Family and Community-derived value-systems through tacit and formal agreements
* Frameworks derived or explicitly communicated from religious texts
* Frameworks outlined by or implied by large Institutional or Municipal entities

Given the subjective nature of assigning value to design process output – specifically at early stages of the process -- a key feature of this project is to invite custom variations of value dimensions frameworks.

**What is Design Process Output?**

Design process output is defined in reference to human centered design, design thinking, and other design innovation frameworks that are user-centered. Hence, types of design process output might include:

* Problem Statements: There are many different terms used to describe problem statements in design process discourse (such as “How Might We” statements, “job-to-be-done” statements, design prompts, etc.). While they are not exactly synonymous, these are the kinds of design process output that would be compatible with this project.
* Insights: Significant highlights from the research phase of design processes are often packaged in insights. Good insights are concise, thought provoking, and capture the essence of some phenomenon in the user experience being investigated.
* Ideas: Ideation or concept generation is probably one of the most familiar activities in the design process.
* Design Principals: Design principals are heuristics that help guide and assess the generation of ideas in the design process. Design Principals are informed by insights and act as pseudo-constraints for evaluating products of the ideation process.

The underlying premise for this work is that measuring the intermediate products of the design process (such as problem statements, insights, ideas, etc.) can lead to more innovative outcomes.

**How to Engage with this Project**

There are two steps in this project: step 1 involves assigning value to your design process output data by prompting ChatGPT to rate each item in your dataset using your value dimensions and step 2 involves analyzing the influence of value dimension in evaluating the design process output data.

*Note: while step 1 by default uses ChatGPT to assign value to each item in your dataset, you could alternatively (and perhaps preferably) rate each item in your dataset manually.*

**Step 1: Calculate Value for your Design Process Output Data**

Input Data Requirements

* ‘Design Process Output’ Dataset (list) of design process output in Excel (.xlsx) format.
* ‘Value Dimensions’ Dataset (list) of value dimensions in Excel (.xlsx) format.
* ‘Scale Definitions’ Dataset (list) of scale definitions in Excel (.xlsx) format.

Python Dependencies

* pandas: Used for reading and manipulating Excel files.
* openai: Used to interact with the OpenAI API.
* openpyxl: Used for writing to Excel files and applying styles.
* tkinter - For file dialog operations (usually comes with Python)
* \*datetime: Part of the Python standard library, used for handling date and time.
* \*os: Part of the Python standard library, used for accessing environment variables.

You can install these dependencies using pip:

pip install pandas openai openpyxl

External Dependencies

* An OpenAI API key set in your environment variables as OPEN\_API\_KEY

Output

* ‘design-process-output-scores’ in excel (.xlsx) format.

**Step 2: Assess Influence of Value Dimensions on the Evaluation of Design Process Output Data using PCA and ICA**

By conducting principal component analysis (PCA) and independent component analysis (ICA) we offer a couple of ways to understand the influence that each value dimension has on the evaluation of design process output data being examined. This step produces PCA Summaries

Input Data Requirements

* ***At least 1*** ‘Value Dimensions’ Dataset (list) of value dimensions in Excel (.xlsx) format.
* ***At least 1*** ‘Ratings’ or ‘design-process-output-scores’ Dataset in excel (.xlsx) format.
  + ***NOTE:*** there is an option to automatically generate alternative ratings for your Value Dimensions dataset that is based on the cosine similarity scores between text strings of your (value dimension + value dimension definitions) x (Design Process Output data). If you did not provide value dimension definitions to help generate this cosine similarity dataset, you will be prompted to generate definitions using ChatGPT. The proposed definitions will be displayed and you’ll have the option to accept, modify, or regenerate definitions.

Output

* PCA Summary:
  + Explained Variance for each Principal Component
  + Variable contributions to the
  + Variable Contributions to each Principal Component
* ICA Summary:
  + Component Contributions from Mixing Matrix
  + Mean, Max, and Min Kurtosis values
* Plots
  + Scatter plot (that can be used to compare any PCs of the user’s choice)
  + Matrix
  + Heatmap
  + (ICA only) Kurtosis values
  + (ICA only) Component Signals
  + (ICA only) Mixing Matrix
* Optional:
  + Generate Principal/Independent Component names
    - This feature uses ChatGPT generate a name that reflects each principal component (PC) or independent component (IC). The results include a name and explanation that reflects the distribution of data along reach respected PC/IC axis.

External Dependencies

* An OpenAI API key set in your environment variables as OPEN\_API\_KEY

Getting Started Docs:

* Design Process Output datasets:
  + Design Prompts example dataset
* Value Dimensions datasets:
  + Maslow’s Hierarchy of Needs
    - Value dimensions
    - Scale definitions
  + Schwartz’s Motivational Types of Values
    - Value dimensions
    - Scale definitions
  + Kiesel et al.’s Taxonomy of 54 Values
    - Value dimensions
    - Scale definitions
  + UN Sustainable Development Goals
    - Value dimensions
    - Scale definitions