

# Modeling Sequential Preferences

Decidio Inc.

## Contact Information

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## Sponsor Background

*In just a couple of sentences, describe the sponsoring entity to introduce students to your organization and mission in a way that shows how this project is relevant to you.*

Decidio uses Cognitive Science and AI to help people make better decisions and to feel better about the decisions they make. We plan to strategically launch Decidio into a small network fanbase, then grow it deliberately, methodically and through analytics into a strong and accelerating network.

## Background and Problem Statement

*Provide background on perceived problem for the student team to solve. What is the motivation for this project?*

When users are making a sequence of decisions to purchase a collection of products like their wardrobe or fixtures when they are remodeling their home then each individual decision is not independent in terms of visual and structural features. For example, while choosing light fixtures for a kitchen, the recessed lighting, pendant lighting, dining table lighting, and studio lights for wall art are all chosen with the overall theme of materials, sizing, style, form, color, etc. Users making these choices get overwhelmed with such decisions because each one must not only match the overall theme but also to work well with other choices that are made. Sometimes there is an inversion of preferences as well. For example, one might not like red colored cars in general, but they really like red color on a particular car (such as a Mustang or Corvette). In this case, there is an exception to their preference for a single item from the collection.

With an innovative visual interface that allows users to navigate their preferences by switching between left brain and right brain interactions (photos vs tables of numbers), Decidio seeks to make the process of discovering, modeling, and interacting with user preferences more pleasurable.

# Project Description

*What are your initial thoughts about a potential solution that addresses the problem presented above? Briefly describe your envisioned software solution to be developed by the student team. Use cases and examples are useful. Provide insight into how this potential solution will be beneficial to end users.*

The preference learning project aims to develop a machine learning model that models preferences in both the visual domain (pictures of items) and in the features domain (tables of numbers with feature labels). For this project, we want to build an initial database of products with their features and their photos. Then from the app interface, users will search or select products from either a gallery of images that appear while swiping right or the collection of features that appears while swiping left. Each user will have a profile with a named collections of products that they can add to a list of related products. Users indicate their preferences by reordering images or selecting features to narrow down suggested products. They can add their selected products to lists.

Expected features of the app:

1. A database of scraped product set within a couple of categories (Decidio already has a few items for lighting design and fountain pens that are scraped. This can serve as a starting point)
2. A visual interface for displaying groups of product images for comparison and selection and separately for displaying product features. An existing prototype of this interface will be useful to see as a starting point.
3. A set of preference models with some test users and benchmarks for validating the accuracy and consistency of these models on the given product categories.

There will be 2 machine learning models that will get trained from data collected from this interface:

1. An individual preference model that sequentially updates products based on user input of preferences
2. A separate model that evaluates the “goodness” or “coherence” of a given list of items

# Technologies and Other Constraints

*Provide a list of technologies that you expect students to use. Indicate if each technology is a requirement or a suggestion. If flexible or up to students to choose, please state that. Indicate preferred paradigms (e.g., desktop, cli, web-based, mobile, etc.) to be used in this project for each major component of the expected solution. If flexible, please state that. Indicate if there are any other limitations or constraints you would like the students to know about (e.g., licensing constraints, legal issues, IP issues, etc.), or state that there are none.*

There are no technical constraints on this project. We will choose our tools that best work with

- Students will be required to sign over IP to sponsors when the team is formed (please check box only if this is the case for submitted project).**