Product Requirements Document: Image Recognition for Non-Branded Product Search

1. Project Goal

The primary goal of this project is to **empower B2B users to efficiently identify and search for non-branded products** within our existing B2B search engine using image recognition technology. This will streamline the product discovery process, reduce manual effort, and improve the accuracy of search results for generic or unidentifiable items, ultimately enhancing user experience and operational efficiency for our B2B clients.

2. Core Functionality & Output

The system will enable users to upload an image of a non-branded product, process it using image recognition, and then automatically initiate a relevant product search within the B2B search engine.

Core Functionality:

- **Image Upload:** Users will be able to upload product images via a web interface or a mobile application.
- **Image Pre-processing:** The system will perform necessary pre-processing on the uploaded image (e.g., resizing, cropping, noise reduction) to optimize it for recognition.
- **Image Recognition & Feature Extraction:**
  - The system can leverage an **external image recognition service/API** to analyze the uploaded image.
  - It will identify key visual features, shapes, colors, textures, and potential product categories.
  - For non-branded products, the focus will be on generic product attributes rather than specific brand logos or packaging.
- **Attribute Extraction & Keyword Generation:** Based on the image recognition results, the system will extract relevant product attributes (e.g., "stainless steel bolt," "plastic container," "wooden pallet," "ceramic tile") and generate a set of descriptive keywords.
- **Product Search Integration:** The generated keywords and attributes will be automatically fed into the existing B2B search engine.
- **Search Result Display:** The search engine will display relevant product listings based on the image-derived query, similar to a standard text-based search.

Output:

- **Identified Product Attributes/Keywords:** A list of descriptive terms derived from the image analysis.
- **Search Engine Query:** The constructed query sent to the B2B search engine.
- **Confidence Score (Optional but Recommended):** An indication of how confident the system is in its recognition.

3. Requirements

3.1. General Requirements

- **Scalability:** The solution must be scalable to handle a high volume of image uploads and recognition requests.
- **Performance:** Image processing and search initiation should be fast, aiming for a response time of under 5 seconds from upload to initial search results.
- **API-First Approach:** The image recognition and search integration should be built with robust APIs to allow for future extensibility and integration with other platforms.

3.2 Supported Input Formats

The system will support the following image input formats:

- **JPEG (.jpg, .jpeg):** Widely used for photographs, offering good compression.
- **PNG (.png):** Supports lossless compression and transparency, suitable for images with text or sharp edges.

3.3. Integration with B2B Search Engine

- **Existing Search Engine API:** The solution will interface with the existing B2B search engine's API for query submission and result retrieval.
- **Query Construction Logic:** Develop robust logic to translate image-derived attributes into effective search queries, considering existing search engine capabilities (e.g., boolean operators, filtering, categorization).
- **Error Handling:** Implement comprehensive error handling for failed image uploads, recognition failures, or search engine issues, providing clear feedback to the user.

4. Success Metrics

The success of the image recognition feature will be measured by the following metrics:

- **Image Recognition Accuracy:**
    - **Top-1 Accuracy:** Percentage of images where the top-ranked identified

product attribute/category is correct (Target: >85%).
    - **Top-5 Accuracy:** Percentage of images where the correct product attribute/category is among the top 5 identified (Target: >95%).
- **Performance:**
    - **Average Response Time:** Time from image upload to search results display (Target: <5 seconds).

5. Example Workflow

Here's a step-by-step example of how a B2B user, "Priya," an inventory manager, would use the feature:

1. **Scenario:** Priya needs to reorder a specific type of unbranded industrial screw for her factory, but she doesn't know its exact specifications or part number. She only has a physical sample of the screw.
2. **Action: Access Feature:** Priya logs into the B2B portal and navigates to the "Product Search" section. She sees a new option: "Search by Image."
3. **Action: Upload Image:** Priya clicks "Search by Image" and is prompted to upload an image. She takes a clear photo of the industrial screw using her mobile phone and uploads it.
4. **System Process: Image Recognition:**
    - The system receives the image.
    - It sends the image to the integrated external image recognition service.
    - The service analyzes the image and identifies key attributes: "hex head," "machine screw," "steel," "silver color," "threaded."
5. **System Process: Query Generation:**
    - The system constructs a search query based on these attributes, e.g., "hex head machine screw steel silver threaded".
6. **System Process: Search Engine Integration:**
    - The generated query is automatically submitted to the B2B search engine.
7. **Output: Display Search Results:**
    - The B2B search engine returns a list of relevant industrial screws from the catalog, ranked by relevance.
    - Priya sees various hex head machine screws, including different sizes and materials.
8. **Action: Connect:**
    - She finds the exact screw she needs and connects with the vendor.