HaggleKat tool – codename <**Dealfinder**>

# Objective

To develop a tool which, given an input image, can identify the product features and display the best deals on the product from eBay and Amazon.

# Background

HaggleKat is a fashion, style, and lifestyle blog based in Orange County, CA, managed by Social Media Influencer Jocelyn Walker. HaggleKat has a great group of real, active, and engaged followers across all social networks. The business demands a tool to be developed which can be used by customers to find deals on eBay and Amazon simply by uploading a picture of the product. The tool will provide all possible deals to the customer and business will earn affiliate income on the product provided the customer has purchased it via the link provided.

# Assumptions/Risks

## 3.1 Assumptions

The following assumptions hold true for the tool:

1. The tool will support only images in jpeg format as input from the user. No other format of input will be supported.
2. The tool will be an app based on native Android/iOS platform.
3. The tool will only provide clickable deals to the user and will not interact in any other form.

## 3.2 Risks

The following known risks are applicable for the tool:

1. The tool may offer incorrect product deals to the user due to inaccurate predictions by the backend model.   
   Impact - Poor user experience.
2. The tool may offer product deals which may not belong to the same geographic location as the user.  
   Impact – Users will not be able to order the product due to geographic restrictions.
3. Users may use the tool to check for product prices online and not purchase the product.  
   Impact – Revenue will be impacted without conversions.

# Scope

## 4.1 In scope

1. Identifying features from a single image at a time and displaying the product deals from eBay and Amazon.
2. The tool will display only the affiliate-fused links from eBay and Amazon, no other platform will be supported.
3. Current design will only develop an MVP tool and will not focus on performance and accuracy.
4. The tool will identify fashion apparels only and will operate on a picture which contains only the product.

## 4.2 Out of scope

1. Tracking conversion rates of the users based on the purchase summary.
2. Looking up product listings for multiple images at a go.
3. Providing product deals based on the user location.
4. User login portal and preference-based recommendations.
5. Multiple product detection from single image.

# Requirement

The requirement is to identify the correct deals of the product from eBay and Amazon using a neural network and provide the affiliate links of the same to the user.

# Solution design

## 6.1 Proposed solution

The tool will request for the user for a product image. The user can either click and upload a picture or select a picture from the gallery. The picture should contain only an image of the product with the logo in focus if possible. The tool will take this input image and process it using a backend neural network which will give out 3 different types of output –

1. features of the image
2. logo of the product if visible in the image
3. web links for the product (applicable for Google API only)

## 6.2 Backend neural network architecture

The tool will utilize a neural-network based image recognition and feature extraction architecture. Business has the option of either deploying a proprietary model with the tool or use a 3rd party pre-trained model via API calls. The details of both the approach will be picked up as a decision requirement from the business at a later part of the document.

## 6.3 Handling of the outputs

The handling of outputs depend on the type of results the business expects to utilize.

* A combination of image features and logo features can be fed to the eBay/Amazon API as search strings to obtain products which are similar in nature to the input image. This process will only produce similar outputs and may not display the actual product the user may have searched for.
* Extracting the weblinks for the product directly can be used to provide the exact deal of the image the user is looking for. The weblinks are based on image search algorithm used by Google.

The steer received from the business is that the tool will provide both options to the user – deals for the exact product or look for similar products.

## 6.4 Process Flow

## 6.5 Mock up UI Design

<https://www.fluidui.com/editor/live/project/p_94TBTfrL7Tz7p0VGC1UIiErbVFDbFLMJ>

# Backend neural network architecture proposals

The backend neural network architecture can be implemented in different ways, each with its own pros and cons.

*Note: The business is to decide which architecture fits the purpose.*

## 7.1 Proprietary Image recognition and feature extraction model

The solution can implement a proprietary model which can be trained on different datasets – apparel identification using Fashion MNIST dataset and logo identification using Flickr27 and Flickr32 datasets. The model can then be implemented on cloud or on local storage along with tool. The model will identify the image features and the logo to create a search key string. This key string can then be fed into the eBay and Amazon API to obtain the product deals.

**PROS:**

1. Proprietary model which can be tuned and customised as per needs
2. Can be deployed locally to provide maximum privacy
3. Low cost maintenance

**CONS:**

1. Less accurate and not scalable
2. Cannot extract weblinks of the product
3. Cannot look up deals for the exact product

## 7.2 Clarifai API – [www.clarifai.com](http://www.clarifai.com)

Clarifai offers pretrained neural network models which can be used to extract features and logos. To suite the business needs two models have been identified – apparel identification and logo identification.

Apparel - <https://www.clarifai.com/models/apparel-image-recognition-model-e0be3b9d6a454f0493ac3a30784001ff>

Logo - <https://www.clarifai.com/models/logo-image-recognition-model-c443119bf2ed4da98487520d01a0b1e3>

Two api calls will be required to extract the features and the logo. After extraction, the strings can be combined to form a search key string which can be fed into the eBay and Amazon APIs to get the deal list.

Pricing –

5000 free operation calls per month, after which $1.20 / 1,000 operations for pre-built models.

PROS:

1. Cost effective API charges and support
2. Pre-trained models available which can be deployed directly into cloud
3. No training required and features can be extracted with simple API calls

CONS:

1. Exact product search not possible, only similar products can be identified
2. Geo-specific meta tags cannot be extracted
3. 2 API calls required for a single image

## 7.3 Google Vision API - https://cloud.google.com/vision/

Google Cloud Vision API enables developers to understand the content of an image by encapsulating powerful machine learning models in an easy to use REST API. It quickly classifies images into thousands of categories. Vision API has different functions built in which can be used to extract different types of features. The API offers feature extraction, weblink search and geo-specific meta tags.

Pricing –

1000 free units per month, after which $1.5/1001-5000000 units per month. (1 unit = 1 function)

PROS:

1. Highly accurate and scalable
2. Provides features for similar product search and direct web links to the product
3. Provides geo-specific meta tags which can be used to provide personalised deals to the user

CONS:

1. Comparatively costlier when it comes to free usage
2. Need to be deployed using GCP