



CSST 102 – BSCS 3A

DermaGlow AI

Dermatology Essentials and Product Ingredient Analyzer Bot

Group Members

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Introduction

Group Members:



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Introduction

Purpose of the Project:

The Dermatology Essentials and Product Ingredient Analyzer Bot helps individuals to make smart choices about skincare essentials. It provide users with a convenient tool to analyze skin concerns and recommend suitable skincare products based on their skin types, specific needs, and ingredient preferences to promote healthier and better skincare habits.

Introduction

Domain

The project is in the dermatology and skincare domain, focusing on analyzing skin concerns and recommending suitable skincare products based on user input. By analyzing these concerns, this bot recommends the right products that would work best for each person, making skincare more personal and effective.

Introduction

Reasoning Method

Natural Language Processing (NLP) for Intent Recognition

This chatbot understands the user's intent and extracts key features (product type, preferences). This is a combination of rule-based and machine learning methods for example, intent classification with Naive Bayes, NN and BERT).

Example:

- The chatbot detects that the user mentioned “*want*” and “*toner*,” so it classifies this intent as a request for a product recommendation.

Implementation:

Combined these with a machine learning classifier trained on labeled intents.

Data Preparation

product id	product name	product type	main ingredients	ingredient benefits	suitability	directions for use	skin concerns	skin concerns addressed	allergens/ingredients to avoid	prices	alcohol free	cruelty free	fragrance free
1	delo SunExpert Whitening Sunscreen SPF50 50ml	Moisturizer	Water, Ethylhexyl Methoxycinnamate, Cyclobutylsiloxane, Cyclopentasiloxane, Niacin	Hydrates skin, soothe	All skin types	Apply after cleansing	Daily, Dry	Fade dark spots, even out s	Ethylhexyl Methoxycinnamate (C	359.00	no	yes	yes
2	Human Nature Hyaluronic Acid Gel Day Moisturize	Moisturizer	Water, Propanediol, Betaine, Glycerin, Stearyl Alcohol, Aloe Barbadosis Leaf Juice, Glycine So	99.82% Natural We	All skin types	After cleansing and i	Sensitive	Anti-aging, brightening, sea	Stearyl Alcohol, Cetearyl Alcohol	250.00	no	yes	yes
3	Ellana Mineral Cosmetics Even Better Skin Care Ti	Moisturizer	Water, Cyclopentasiloxane, Titanium Dioxide, Peg-10 Dimethicone, Triethoxycaprylylsilane, Sil	Ellana Skin Care Tim	All skin types	an, moisturized skin	Aging, Wrinkles/Fine Lines	Hydrating, Acne Fighting, B	Silicones (e.g., Cyclopentasiloxan	225.00	no	yes	yes
4	Barrebliss BNB Mari Mori Makeup Remover Wipe	Cleanser	Water, Sodium Lauroyl Sarcosinate, Methylpropanediol, Decyl Glucoside, Phenoxyethanol, PEG	Marigold-Moringa oi	All skin types	Wipes. Ensure all area	Sensitive	Soothes the skin.	Amino Acid Surfactants: These ge	199.00	yes	yes	no
5	Garnier Pink Micellar Water Pink (125ML/400ML)	Cleanser	AQUA / WATER, HEXYLENE, GLYCOL, GLYCERIN, DISODIUM COCOAMPHODIACETATE, DISODIUM	Cleanses like toner, g	All skin types	and lips to remove m	Combination	Sensitive, Dry, Normal, Com	Hexylene Glycol: Functions as a s	199.00	yes	yes	yes
6	Luxe Organic Aloe Vera Soothing Gel 100ml Sachet	Moisturizer	Aloe Barbadosis Leaf Juice, Water, Aloe Barbadosis Leaf Juice Powder, Glycerin, Carbomer, Arginine, Phenoxyeth		All skin types	step out of reach of	Daily, Dry	Sensitive, Dry, Normal, Com	Aloe Barbadosis Leaf Juice and l	109.00	yes	yes	no
7	Pond's Bright Beauty Serum Day Cream SPF30	Moisturizer	Aqua, Octocrylene, Ethylhexyl Salicylate, Stearic Acid, Niacinamide, Glyceryl Stearate, Butyl Me	Pond's Bright Beauty	All skin types	fter 7 continuous da	Sensitive	Sensitive, Dry, Normal, Com	Niacinamide (Vitamin B3): Know	360.00	yes	yes	no
8	ibfresh, Hydrating Lip Serum, Cherry Bomb, 0.5 fl. o	Serum	Caprylic/Capric triglyceride, glycerin, water (aqua, eau), quillaja saponaria (soapbark) wood ex	It's Lip Care Done. Di	All skin types	. Reapply if necessary	Dry	Sensitive, Dry, Normal, Com	Jojoba Seed Oil (Simmondsia Chi	250.00	yes	yes	no
9	PAPA FEEL 3X Retinol Cream 30g anti wrinkles s	Moisturizer	3X Retinol, soluble collagen (collagen), tocopherol (Vitamin E), and ceramide NP	Moisturizing texture	All skin types		skies or melasma. Us	Sensitive, Dry, Normal, Com	Retinol and Retinol Derivatives: I	300.00	yes	yes	yes
10	Green Herb Hydrating Gel 50ml	Moisturizer	Guava leaf, Hyaluronic acid, Centella Asiatica, Aloe Vera, Distilled Water, Menthol	Hydrates dry wound	All skin types	assage until fully ab	Dry	Sensitive, Dry, Normal, Com	Menthol: Can cause irritation or	400.00	yes	yes	no
11	SNDE MORE AWESOME PORESOME PORE PERFEC	Serum	Aqua (Water), Glycerin, Hamamelis Virginiana (Witch Hazel) Extract, Carica Papaya (Green Pap	pore-minimizing, re	All skin types	s with visible pores	Dullness/Uneven Texture	Sensitive, Dry, Normal, Com	Witch Ham: May cause irritatio	359.00	no	yes	no
12	Garnier Vitamin E Day Cream with SPF36 50ML	Moisturizer	AQUA/WATER, GLYCERIN, ALCOHOL, STEARIC ACID, OCTOCRYLENE, PALMITIC ACID, BUTYL ME	lighten and protec	All skin types	ssage. Avoid the a	Sensitive	Sensitive, Dry, Normal, Com	Fragrance (Parfum): Can cause al	399.00	no	yes	no
13	Luxe Organic Power Glow Vita Glow C Whip Clean	Cleanser	Water, Glycerin, Palmitic Acid, Stearic Acid, Myristic Acid, Potassium Hydroxide, Lauric Acid, Sc	cleanses face with	All skin types	ly massage onto a sk	Aging, Dry, Sensitive	Sensitive, Dry, Normal, Com	Cocamidopropyl Betaine: Can cau	5	yes	yes	yes
14	GLAD2GLOW Yuja Symwhite 377 Dark Spot Serum	Serum	AQUA, BUTYLENE GLYCOL, GLYCERIN, CITRUS JUNOS FRUIT EXTRACT, 3-D-ETHYL ASCORBIC AC	fades dark spots & a	All skin types	s. Gently pat until ab	Dullness/Uneven Texture	Sensitive, Dry, Normal, Com	Citrus Junos Fruit Extract (Yuja): i	277.00	no	yes	no
15	Mary Elizabeth R: Rosehip & Fruits Serum Rosehip	Serum	Water, Rosehip Oil, Fruit Acid Extract (Pineapple, Orange, Lemon, Strawberry, Tomato, Calama	Acne Care.Sensitive,	All skin types	atch test to determi	Combination	Sensitive, Dry, Normal, Com	Fruit Acid Extract (Pineapple, Ora	275.00	yes	yes	yes
16	Soul Apothecary: Snail Repair Serum (with Centell	Serum	Snail Secretion Filtrate, Niacinamide, Centella Asiatica Extract, Allantoin, Papain, Tocopherol (V	Snail Secretion Filtra	All skin types	assage until fully ab	Aging, Dry, Sensitive	Sensitive, Dry, Normal, Com	Snail Secretion Filtrate: While sn	300.00	yes	yes	yes
17	Human Nature Vitamin C + Hya Calamansi Radianc	Serum	aqua (water)*, propanediol*, glycerin*, ascorbyl glucoside*, zinc lactate*, Citrus microcarpa (c	helps bring out natu	All skin types	assage until absorbed	Combination	Sensitive, Dry, Normal, Com	Citrus Microcarpa (Calamansi) Fr	495.00	yes	yes	no
18	Galactomyces Serum Magic Liquid Water Essence	Serum	Galactomyces Ferment Filtrate, Butylene Glycol, Niacinamide, Panthenol, Hydrolyzed Hyaluroni	Anti Aging, Skin Nour	All skin types	pat until absorbed.	Acne/Blemishes, Dark spots/ Hyperp	Sensitive, Dry, Normal, Com	Galactomyces Ferment Filtrate: F	350.00	yes	yes	yes
19	Organic Skin Japan Antiacne Whitening Collection	Moisturizer	Salicylic acid, Tea Tree Extract, Niacinamide	Helps reduce oiliness	All skin types	one areas. Gently ma	Acne/Blemishes, Dark spots/ Hyperp	Sensitive, Dry, Normal, Com	Salicylic Acid: As an exfoliating ag	179.00	yes	yes	yes
20	GLAD2GLOW Milk Amino Acids Gentle Cleanser	Cleanser	AQUA, POTASSIUM PALM KERNELATE, POTASSIUM COCOATE, POTASSIUM COCOYL	deeply cleans the sk	All skin types	wage in circular moti	Dry, Only	Sensitive, Dry, Normal, Com	Milk Protein Extract: People with	175.00	yes	yes	no

We collected approved skin care products and other related data from **FDA website** with entries that are timely, significant and complete. To keep things relevant, we selected key fields like product ID, name, type, main ingredients, their benefits, suitability, directions for use, skin concerns, allergens to avoid, pricing, and whether the products are alcohol-free, cruelty-free, or fragrance-free. This way, our dataset stays relevant and meaningful for the analysis.

FDA Website: https://verification.fda.gov.ph/COSMETIC_ALL_INDUSTRYlist.php

Data Preparation

product_id	product_name	product_type	main_ingredients	ingredient_benefits	suitability	directions_for_use	skin_concerns	skin_concerns_addressed	allergens_ingredients_to_avoid	prices	alcohol_free	cruelty_free	fragrance_free
1	delo SunExpert Whitening Sunscreen SPF50 50ml	Moisturizer	Water, Ethylhexyl Methoxycinnamate, Cyclobutylsiloxane, Cyclopentasiloxane, Niacin	Hydrates skin, sooth	All skin types	Apply after cleansing	Oily, Dry	Fade dark spots, even out s	Ethylhexyl Methoxycinnamate (C	359.00	no	yes	yes
2	Human Nature Hyaluronic Acid Gel Day Moisturize	Moisturizer	Water, Propanediol, Betaine, Glycerin, Stearyl Alcohol, Aloe Barbadosis Leaf Juice, Glycine So	99.82% Natural We	All skin types	After cleansing and i	Sensitive	Anti-aging, brightening, sea	Stearyl Alcohol, Cetearyl Alcohol	250.00	no	yes	yes
3	Ellana Mineral Cosmetics Even Better Skin Care Ti	Moisturizer	Water, Cyclopentasiloxane, Titanium Dioxide, Peg-10 Dimethicone, Triethoxycaprylylsilane, Sil	Ellana Skin Care Tim	All skin types	an, moisturized skin	Aging, Wrinkles/Fine Lines	Hydrating, Acne Fighting, Br	Silicones (e.g., Cyclopentasiloxan	225.00	no	yes	yes
4	Barebloss BNB Mari Mori Makeup Remover Wipe	Cleanser	Water, Sodium Lauroyl Sarcosinate, Methylpropanediol, Decyl Glucoside, Phenoxyethanol, PE	Marigold-Moringa oi	All skin types	Wipes. Ensure all area	Sensitive	Soothes the skin.	Amino Acid Surfactants: These ge	199.00	yes	yes	no
5	Garnier Pink Micellar Water Pink (125ML/400ML)	Cleanser	AQUA / WATER, HEXYLENE, GLYCOL, GLYCERIN, DISODIUM COCOAMPHODIACETATE, DISODIUM	Cleanses like toner, g	All skin types	and lips to remove m	Combination	Sensitive, Dry, Normal, Com	Hexylene Glycol: Functions as a s	199.00	yes	yes	yes
6	Luxe Organic Aloe Vera Soothing Gel 100ml Sachet	Moisturizer	Aloe Barbadosis Leaf Juice, Water, Aloe Barbadosis Leaf Juice Powder, Glycerin, Carbomer, Arginine, Phenoxyeth		All skin types	Wipe out of reach of c	Oily, Dry	Sensitive, Dry, Normal, Com	Aloe Barbadosis Leaf Juice and l	109.00	yes	yes	no
7	Pond's Bright Beauty Serum Day Cream SPF30	Moisturizer	Aqua, Octocrylene, Ethylhexyl Salicylate, Stearic Acid, Niacinamide, Glyceryl Stearate, Butyl Me	Pond's Bright Beauty	All skin types	fter 7 continuous da	Sensitive	Sensitive, Dry, Normal, Com	Niacinamide (Vitamin B3): Know	160.00	yes	yes	no
8	b'fresh Hydrating Lip Serum, Cherry Bomb, 0.5 fl.oz	Serum	Caprylic/Capric triglyceride, glycerin, water (aqua, eau), quillaja saponaria (soapbark) wood ex	It's Lip Care Done Di	All skin types	Reapply if necessary	Dry	Sensitive, Dry, Normal, Com	Jojoba Seed Oil (Simmondsia Chi	250.00	yes	yes	no
9	PAPA FEEL 3X Retinol Cream 30g anti wrinkles s	Moisturizer	3X Retinol, soluble collagen (collagen), tocopherol (Vitamin E), and ceramids NP	Moisturizing texture	All skin types		Aging, Dry, Sensitive	Sensitive, Dry, Normal, Com	Retinol and Retinol Derivatives: I	300.00	yes	yes	yes
10	Green Herb Hydrating Gel 50ml	Moisturizer	Guava leaf, Hyaluronic acid, Centella Asiatica, Aloe Vera, Distilled Water, Menthol	Hydrates dry wound	All skin types	assage until fully ab	Dry	Sensitive, Dry, Normal, Com	Menthol: Can cause irritation or i	400.00	yes	yes	no
11	SNDE MORE AWESOME PORESOME PORE PERFEC	Serum	Aqua (Water), Glycerin, Hamamelis Virginiana (Witch Hazel) Extract, Carica Papaya (Green Pap	pore-minimizing, re	All skin types	s with visible pores	Dullness/Uneven Texture	Sensitive, Dry, Normal, Com	Witch Ham: May cause irritatio	359.00	no	yes	no
12	Garnier Vitamin E Day Cream with SPF36 50ML	Moisturizer	AQUA/WATER, GLYCERIN, ALCOHOL, STEARIC ACID, OCTOCRYLENE, PALMITIC ACID, BUTYL ME	lighten and protec	All skin types	ssing. Avoid the a	Sensitive	Sensitive, Dry, Normal, Com	Fragrance (Parfum): Can cause al	399.00	no	yes	no
13	Luxe Organic Power Glow Vita Glow C Whip Clean	Cleanser	Water, Glycerin, Palmitic Acid, Stearic Acid, Myristic Acid, Potassium Hydroxide, Lauric Acid, Sc	cleanses face with	All skin types	ly massage onto a sk	Aging, Dry, Sensitive	Sensitive, Dry, Normal, Com	Cocamidopropyl Betaine: Can cau	5	yes	yes	yes
14	GLAD2GLOW Yuja Symwhite 377 Dark Spot Serum	Serum	AQUA, BUTYLENE GLYCOL, GLYCERIN, CITRUS JUNOS FRUIT EXTRACT, 3-D-ETHYL ASCORBIC AC	fades dark spots & a	All skin types	Gently pat until ab	Dullness/Uneven Texture	Sensitive, Dry, Normal, Com	Citrus Junos Fruit Extract (Yuja): i	277.00	no	yes	no
15	Mary Elizabeth R: Rosehip & Fruits Serum Rosehip	Serum	Water, Rosehip Oil, Fruit Acid Extract (Pineapple, Orange, Lemon, Strawberry, Tomato, Calama	Acne Care.Sensitive,	All skin types	atch test to determi	Combination	Sensitive, Dry, Normal, Com	Fruit Acid Extract (Pineapple, Ora	275.00	yes	yes	yes
16	Soul Apothecary: Snail Repair Serum (with Centell	Serum	Snail Secretion Filtrate, Niacinamide, Centella Asiatica Extract, Allantoin, Papain, Tocopherol (V	Snail Secretion Filtra	All skin types	assage until fully ab	Aging, Dry, Sensitive	Sensitive, Dry, Normal, Com	Snail Secretion Filtrate: While sn	300.00	yes	yes	yes
17	Human Nature Vitamin C + Hya Calamansi Radianc	Serum	aqua (water)*, propanediol*, glycerin*, ascorbyl glucoside*, zinc lactate*, Citrus microcarpa (c	helps bring out natu	All skin types	assage until absorber	Combination	Sensitive, Dry, Normal, Com	Citrus Microcarpa (Calamansi) Fr	495.00	yes	yes	no
18	Galactomyces Serum Magic Liquid Water Essence	Serum	Galactomyces Ferment Filtrate, Butylene Glycol, Niacinamide, Panthenol, Hydrolyzed Hyaluric	Anti Aging, Skin Nour	All skin types	pat until absorbed.	Acne/Blemishes, Dark spots/ Hyperpi	Sensitive, Dry, Normal, Com	Galactomyces Ferment Filtrate: F	350.00	yes	yes	yes
19	Organic Skin Japan Antiacne Whitening Collection	Moisturizer	Salicylic acid, Tea Tree Extract, Niacinamide	Helps reduce oiliness	All skin types	ine areas. Gently ma	Acne/Blemishes, Dark spots/ Hyperpi	Sensitive, Dry, Normal, Com	Salicylic Acid: As an exfoliating ag	179.00	yes	yes	yes
20	GLAD2GLOW Milk Amino Acids Gentle Cleanser	Cleanser	AQUA, POTASSIUM PALM KERNELATE, POTASSIUM COCOATE, POTASSIUM COCOYL	deeply cleans the sk	All skin types	Wage in circular moti	Dry, Oily	Sensitive, Dry, Normal, Com	Milk Protein Extract: People with	175.00	yes	yes	no

Columns in the Dataset:

- **product_id:** Unique ID for each product.
- **product_name:** Name of the skincare product.
- **product_type:** Category (e.g., Moisturizer, Cleanser).
- **main_ingredients:** Key ingredients in the product.
- **ingredient_benefits:** Benefits of the ingredients.

- **suitability:** Suitable skin types (e.g., Oily, Dry).
- **directions_for_use:** Instructions on how to use the product.
- **skin_concerns:** Common skin issues the product addresses.
- **allergens_ingredients_to_avoid:** Allergens or irritants to avoid.
- **prices:** Product cost.
- **Attributes:** **alcohol_free,** **cruelty_free,** **fragrance_free.**

Data Preparation

▼ Data Collection and Handling

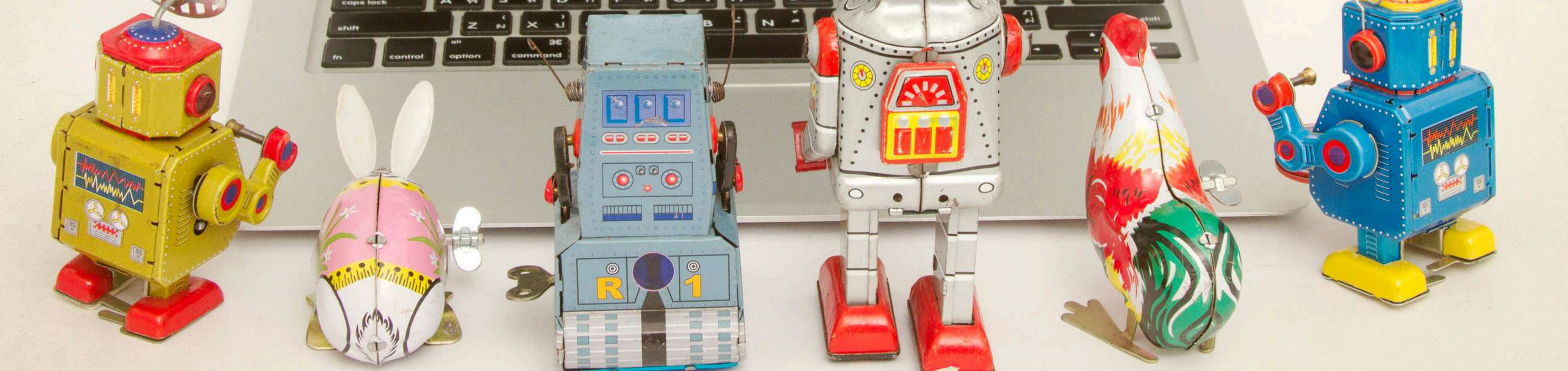
```
data = pd.read_csv("/content/derma_essentials-fda.csv")

data.fillna({
    'product_name': 'Unknown',
    'suitability': 'Unknown',
    'skin_concerns': 'None',
    'main_ingredients': 'None',
    'allergens_ingredients_to_avoid': 'None',
    'prices': 0,
    'cruelty_free': False,
    'fragrance_free': False
}, inplace=True)

data = data.drop_duplicates(subset='product_name', keep='first')

data = data.drop(columns=['Unnamed: 14'])
print(data.isnull().sum())
```

In this step, we imported the derma_essentials-fda.csv dataset, which contains the necessary data for our analysis.



Training the Model

Display training code and explain key parameters (e.g., epochs, learning rate).

Show part of the training output and discuss performance.

Machine Learning Module and Classification Prediction using BERT, Naive Bayes, and Neural Network with TensorFlow

Tokenization Process (BERT)

```
tokenizer = BertTokenizer.from_pretrained('bert-base-uncased')
bert_model = BertForSequenceClassification.from_pretrained('bert-base-uncased', num_labels=len(label_mapping))

encoded_labels = [label_mapping[label] for label in labels]

inputs = tokenizer(intents, padding=True, truncation=True, return_tensors="pt")

train_intents, eval_intents, train_labels, eval_labels = train_test_split(
    intents, encoded_labels, test_size=0.2, random_state=42
)
train_inputs = tokenizer(train_intents, padding=True, truncation=True, return_tensors="pt")
eval_inputs = tokenizer(eval_intents, padding=True, truncation=True, return_tensors="pt")
train_labels_tensor = torch.tensor(train_labels)
eval_labels_tensor = torch.tensor(eval_labels)
```

Bert Setup for NLP

We load a pre-trained **BERT model** and **tokenizer** to classify dermatology-related texts, convert dermatology labels like “acne” or “dry” into numbers, tokenize the texts for BERT while making sure they’re padded and truncated, split the data into training and test sets, tokenize both sets separately and convert the labels into tensors for model input.

Naive Bayes

```
[ ] vectorizer = CountVectorizer()
    X = vectorizer.fit_transform(intents)
    intent_model = MultinomialNB()
    intent_model.fit(X, labels)

    label_encoder = LabelEncoder()
    encoded_labels = label_encoder.fit_transform(labels)

    x_train, x_test, y_train, y_test = train_test_split(X, encoded_labels, test_size=0.2, random_state=42)
```

Naive Bayes Setup

We convert the text data into numerical features with `CountVectorizer`, train the Naive Bayes model using labels like *"acne"* or *"pores,"* encode the labels numerically and split the data into training and test sets for performance evaluation.

Neural Networks using Tensorflow

```
nn_model = models.Sequential()  
nn_model.add(layers.Dense(64, activation='relu', input_dim=X_train.shape[1]))  
nn_model.add(layers.Dense(32, activation='relu'))  
nn_model.add(layers.Dense(len(set(labels)), activation='softmax'))  
  
nn_model.compile(optimizer='adam', loss='sparse_categorical_crossentropy', metrics=['accuracy'])  
  
X_train_dense = X_train.toarray()  
X_test_dense = X_test.toarray()  
history = nn_model.fit(X_train_dense, y_train, epochs=50, validation_data=(X_test_dense, y_test))  
  
results = nn_model.evaluate(X_test_dense, y_test)  
  
print("Test Loss:", results[0])  
print("Test Accuracy:", results[1])  
  
y_pred = nn_model.predict(X_test_dense)  
y_pred_classes = tf.argmax(y_pred, axis=1).numpy()  
  
precision = precision_score(y_test, y_pred_classes, average='weighted')  
recall = recall_score(y_test, y_pred_classes, average='weighted')  
  
print("Test Precision:", precision)  
print("Test Recall:", recall)  
  
results = nn_model.evaluate(X_test_dense, y_test)
```

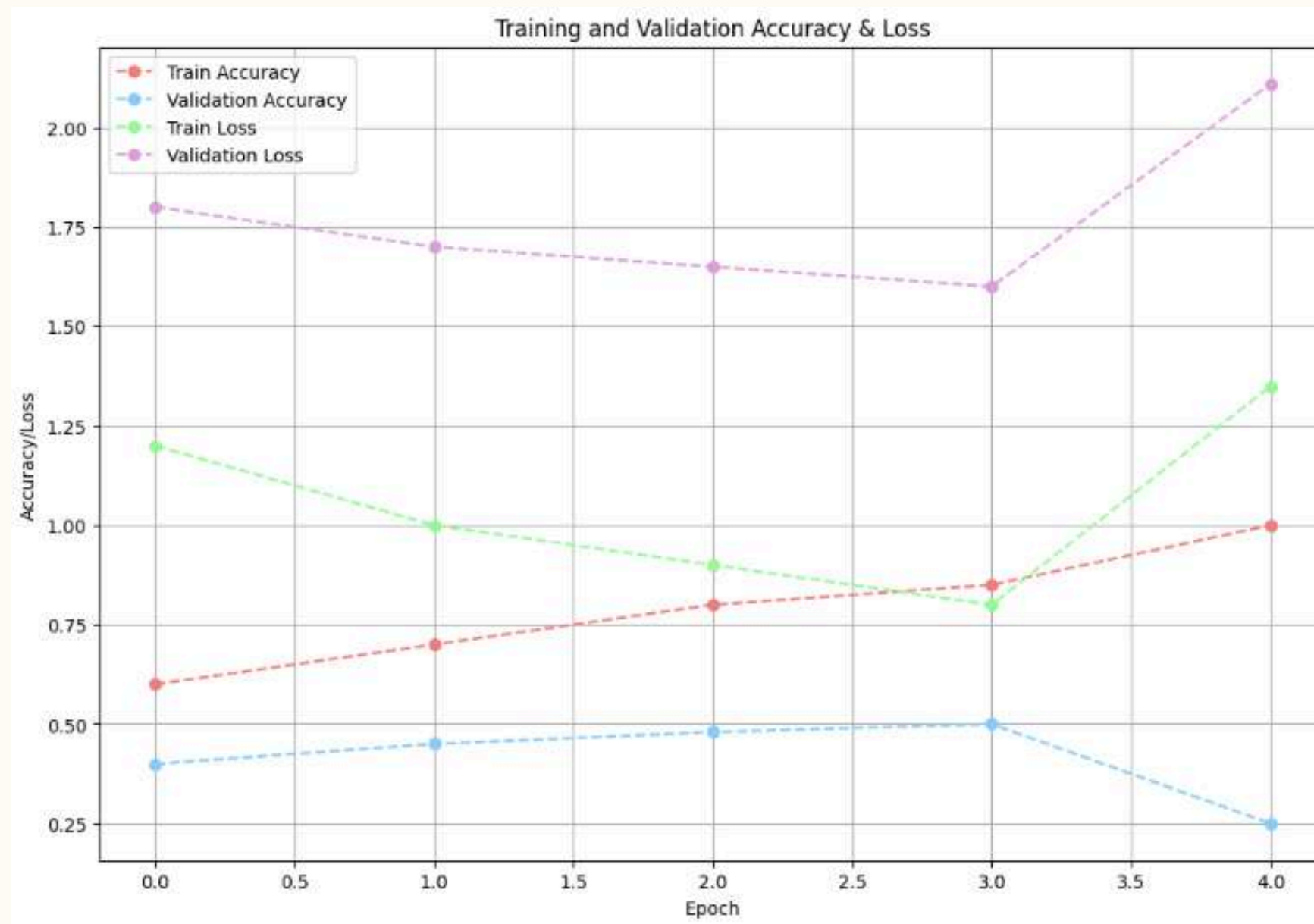
Neural Network Setup with TensorFlow

The code sets up a neural network with two hidden layers and uses softmax for multi-class classification. After training, it checks the model's performance, makes predictions, and calculates precision and recall.

Testing and Evaluation

- Show the chatbot in action with test cases.
 - Discuss performance metrics like accuracy, precision, and recall
-

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Results

Evaluation Results

- The training process over 50 epochs showed improvements in training performance, with accuracy rising from 86.67% to **93.33%** and loss decreasing from **0.91 to 0.78**. By the end of the 50th epoch, this increased to 93.33%, showing that the model became better at recognizing patterns and making correct predictions during training.

Evaluation Results

50 Epochs Training Cycles

```
Epoch 20/50
1/1 ————— 0s 103ms/step - accuracy: 0.8667 - loss: 1.4723 - val_accuracy: 0.0000e+00 - val_loss: 1.9661
Epoch 21/50
1/1 ————— 0s 112ms/step - accuracy: 0.8667 - loss: 1.4458 - val_accuracy: 0.0000e+00 - val_loss: 1.9605
Epoch 22/50
1/1 ————— 0s 122ms/step - accuracy: 0.8667 - loss: 1.4198 - val_accuracy: 0.0000e+00 - val_loss: 1.9548
Epoch 23/50
1/1 ————— 0s 284ms/step - accuracy: 0.8667 - loss: 1.3937 - val_accuracy: 0.0000e+00 - val_loss: 1.9491
Epoch 24/50
1/1 ————— 0s 85ms/step - accuracy: 0.8667 - loss: 1.3675 - val_accuracy: 0.0000e+00 - val_loss: 1.9431
Epoch 25/50
1/1 ————— 0s 149ms/step - accuracy: 0.8667 - loss: 1.3415 - val_accuracy: 0.0000e+00 - val_loss: 1.9365
Epoch 26/50
1/1 ————— 0s 120ms/step - accuracy: 0.8667 - loss: 1.3151 - val_accuracy: 0.2500 - val_loss: 1.9301
Epoch 27/50
1/1 ————— 0s 95ms/step - accuracy: 0.9333 - loss: 1.2887 - val_accuracy: 0.2500 - val_loss: 1.9239
Epoch 28/50
1/1 ————— 0s 96ms/step - accuracy: 0.9333 - loss: 1.2625 - val_accuracy: 0.2500 - val_loss: 1.9179
Epoch 29/50
1/1 ————— 0s 167ms/step - accuracy: 0.9333 - loss: 1.2365 - val_accuracy: 0.5000 - val_loss: 1.9125
Epoch 30/50
1/1 ————— 0s 201ms/step - accuracy: 0.9333 - loss: 1.2105 - val_accuracy: 0.5000 - val_loss: 1.9079
```

```
Epoch 40/50
1/1 ————— 0s 147ms/step - accuracy: 0.9333 - loss: 0.9564 - val_accuracy: 0.5000 - val_loss: 1.8722
Epoch 41/50
1/1 ————— 0s 109ms/step - accuracy: 0.9333 - loss: 0.9319 - val_accuracy: 0.5000 - val_loss: 1.8692
Epoch 42/50
1/1 ————— 0s 150ms/step - accuracy: 0.9333 - loss: 0.9077 - val_accuracy: 0.5000 - val_loss: 1.8664
Epoch 43/50
1/1 ————— 0s 315ms/step - accuracy: 0.9333 - loss: 0.8840 - val_accuracy: 0.5000 - val_loss: 1.8638
Epoch 44/50
1/1 ————— 0s 273ms/step - accuracy: 0.9333 - loss: 0.8606 - val_accuracy: 0.5000 - val_loss: 1.8618
Epoch 45/50
1/1 ————— 0s 133ms/step - accuracy: 0.9333 - loss: 0.8378 - val_accuracy: 0.5000 - val_loss: 1.8598
Epoch 46/50
1/1 ————— 0s 182ms/step - accuracy: 0.9333 - loss: 0.8154 - val_accuracy: 0.5000 - val_loss: 1.8581
Epoch 47/50
1/1 ————— 0s 154ms/step - accuracy: 0.9333 - loss: 0.7937 - val_accuracy: 0.5000 - val_loss: 1.8563
Epoch 48/50
1/1 ————— 0s 131ms/step - accuracy: 0.9333 - loss: 0.7724 - val_accuracy: 0.5000 - val_loss: 1.8546
Epoch 49/50
1/1 ————— 0s 126ms/step - accuracy: 0.9333 - loss: 0.7516 - val_accuracy: 0.5000 - val_loss: 1.8529
Epoch 50/50
1/1 ————— 0s 196ms/step - accuracy: 0.9333 - loss: 0.7313 - val_accuracy: 0.5000 - val_loss: 1.8511
1/1 ————— 0s 37ms/step - accuracy: 0.5000 - loss: 1.8511
Test Loss: 1.8511312007904053
Test Accuracy: 0.5
1/1 ————— 0s 233ms/step
Test Precision: 0.625
Test Recall: 0.5
```

We trained the model for 50 epochs due to the limited size of our dataset.

Evaluation Results

Training vs Validation/Test Accuracy:

- The training accuracy is relatively high (**93.33%**), and the test accuracy is **50%**. This indicates that the model is performing better in terms of generalizing to unseen data compared to previous runs where the test accuracy was lower. There is still a bit of overfitting where training accuracy is higher than test accuracy.

Precision and Recall:

- Test precision is 0.625, which means that when the model predicts a positive class, it is correct **62.5%** of the time. Test recall is 0.5, meaning the model correctly identifies **50%** of all true positive instances. These metrics suggest that the model is making reasonably accurate predictions, with room for improvement in both precision and recall.

Challenges and Future Suggestions

Challenges

- High training accuracy (93.33%) but low test accuracy (50%), indicating overfitting.
- Test precision (0.625) and recall (0.5) show the model can improve in identifying true positives.

Suggestions for Improvement:

- Increase the dataset size to help our model generalize better.
- Apply regularization techniques to reduce overfitting.
- Experiment with different algorithms to improve precision and recall.

Conclusion

This **Dermatology Essential and Product Analyzer Bot** performed well during operation. It can answer some skin care questions accurately including all the features that we added. The model has a high training accuracy of **93.33%**, but its test accuracy drops to **50%**, likely due to small dataset, leading to overfitting. It correctly predicts **62.5% of positive cases** (precision) but only identifies **50% of all true positives** (recall). This means the model is fairly accurate but could still improve in identifying more positive cases. Future suggestions include increasing the dataset size, trying regularization techniques to reduce overfitting, as well as experimenting with different algorithms to improve both precision and recall.

References

DATASET SOURCE

FDA Website: https://verification.fda.gov.ph/COSMETIC_ALL_INDUSTRYlist.php

LEARNING PACKET TOPICS 8-10

<https://classroom.google.com/c/NzA4NTE1Mjk2MjMz/m/NzM5MzAyNjQ1OTk5/details>

SUMMARY TOPIC 1-6

<https://classroom.google.com/c/NzA4NTE1Mjk2MjMz/m/NzM5MzAyNjQ1OTk5/details>



Thanks for watching...