101

ASU CHEF BOT

Project Team 2

Developers and Contributors:

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Team 2 has collaborated to create an Image classification model using Deep Learning Neural Networks to classify images and use a chef bot to recommend a recipe with an image or text input.

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PROJECT SCOPE

Phase 1

Finding the appropriate Data sets

Phase 2

Determining the right model and architecture

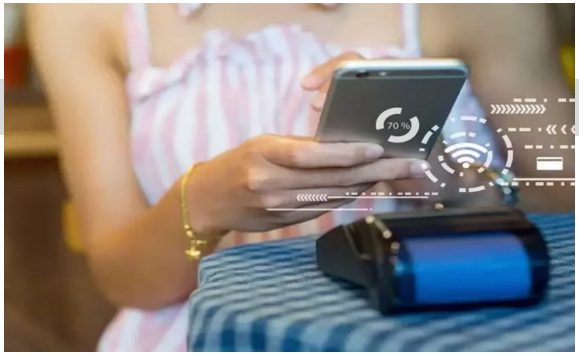
Phase 3

Build, Develop, and Test model for improvements

Phase 4

Launch Chef Bot, Debugged, and Enjoyed!

Executive Summary



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Executive Summary

A creative approach was taken to develop a recipe recommendation bot that would increase grocery sales by providing recipes, ingredients, and approximate cost of a recommended meal.

Fintech and Financial Programming

- Scientific approach to data gathering and preparation
- Machine Learning Architecture and development
- User Interface and Bot development
- Deployment, Testing, and Debugging
- Beta Launch Application

Approach: Phase 1

Data Collection, Clean up, and Exploration

Data sets: Kaggle, Web Scraping, BlueCart API, Kroger API

- Text Datasets For the word cloud

- Data Sets with images of Ingredients from Kaggle
- Food101 , Fruits & Vegetables

- Made use of several API's (Spoonacualr , Telegram)
- Bluecart and Kroger for later developments
- Web Scraping with Beautifulsoup
- Exploration of images and organized data

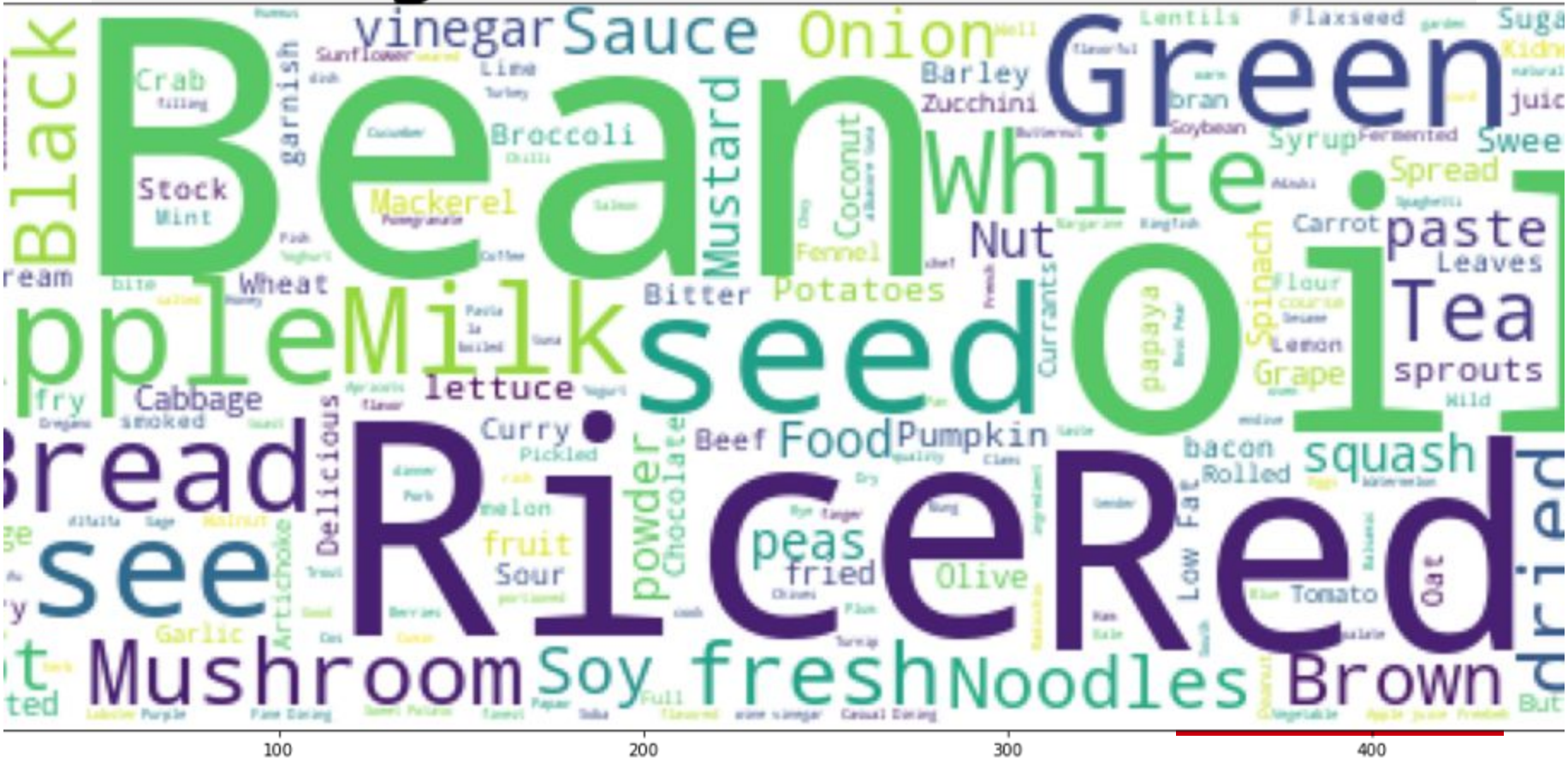
Clean up included conversion, division, and sizing using built in Keras Preprocessing methods

Notes:

High Capacity GPU needed model training,

NER Word Cloud with data

Ingredients Word Cloud



Phase 2

Team Approach

Approach: Applied CNN architecture using a Keras sequential model and a Keras API with 5 layers and deployed using Telegram API

- Convolutional Neural Networks are widely used for the task of image classification because of their inherent ability to reduce the dimensions of the input image data.
- While they are less computationally intensive as other Algorithms like SVM's for classification they still require some reasonable resources like GPU's.
- Telegram an open source messaging app was chosen as the interactive medium to showcase the results of the model built.

Challenges and Success:

Epoch time frame, Bot Bugs , Accuracy

Functionality, Live Deployment

Deep Learning Layers

```
Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_2 (Conv2D)            (None, 98, 98, 2)         56

max_pooling2d_2 (MaxPooling  (None, 49, 49, 2)         0
2D)

conv2d_3 (Conv2D)            (None, 47, 47, 4)         76

max_pooling2d_3 (MaxPooling  (None, 23, 23, 4)         0
2D)

flatten_1 (Flatten)          (None, 2116)              0

dense_2 (Dense)              (None, 3000)              6351000

dense_3 (Dense)              (None, 1500)              4501500

dense_4 (Dense)              (None, 500)               750500

dense_5 (Dense)              (None, 148)               74148

=================================================================
```

Model 148 Architecture

148 Classes with Mixed Food's

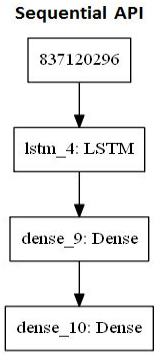
```
Model: "sequential_1"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 conv2d_2 (Conv2D)           (None, 198, 198, 32)      896

 max_pooling2d_2 (MaxPooling  (None, 99, 99, 32)       0
 2D)

 dropout_2 (Dropout)         (None, 99, 99, 32)        0

 conv2d_3 (Conv2D)           (None, 97, 97, 64)        18496

 max_pooling2d_3 (MaxPooling  (None, 48, 48, 64)       0
 2D)

 dropout_3 (Dropout)         (None, 48, 48, 64)        0

 flatten_1 (Flatten)         (None, 147456)            0

 dense_4 (Dense)             (None, 3000)              442371000

 dense_5 (Dense)             (None, 1500)              4501500

 dropout_4 (Dropout)         (None, 1500)              0

 dense_6 (Dense)             (None, 500)               750500

 dense_7 (Dense)             (None, 36)                18036
```

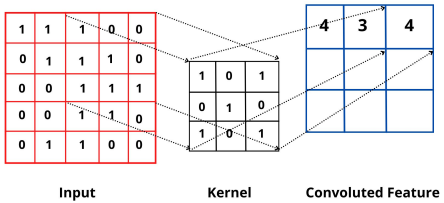
Model 36 Architecture

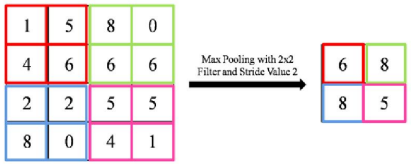
36 Classes of Only Fruits and Vegetables

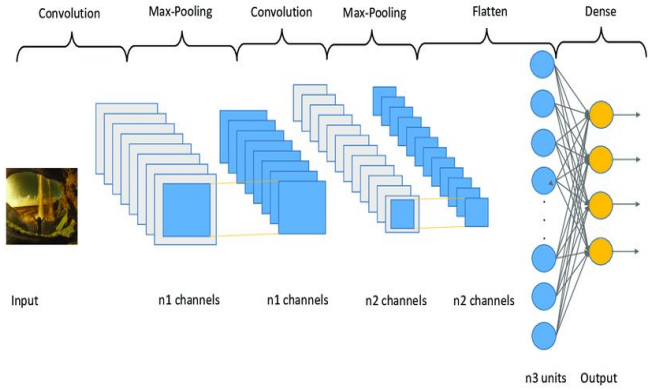
Model Layers

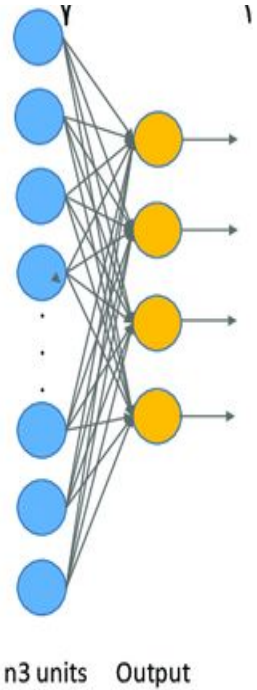
Sequential | Conv2D | MaxPooling 2d | Flatten | Dense Layers



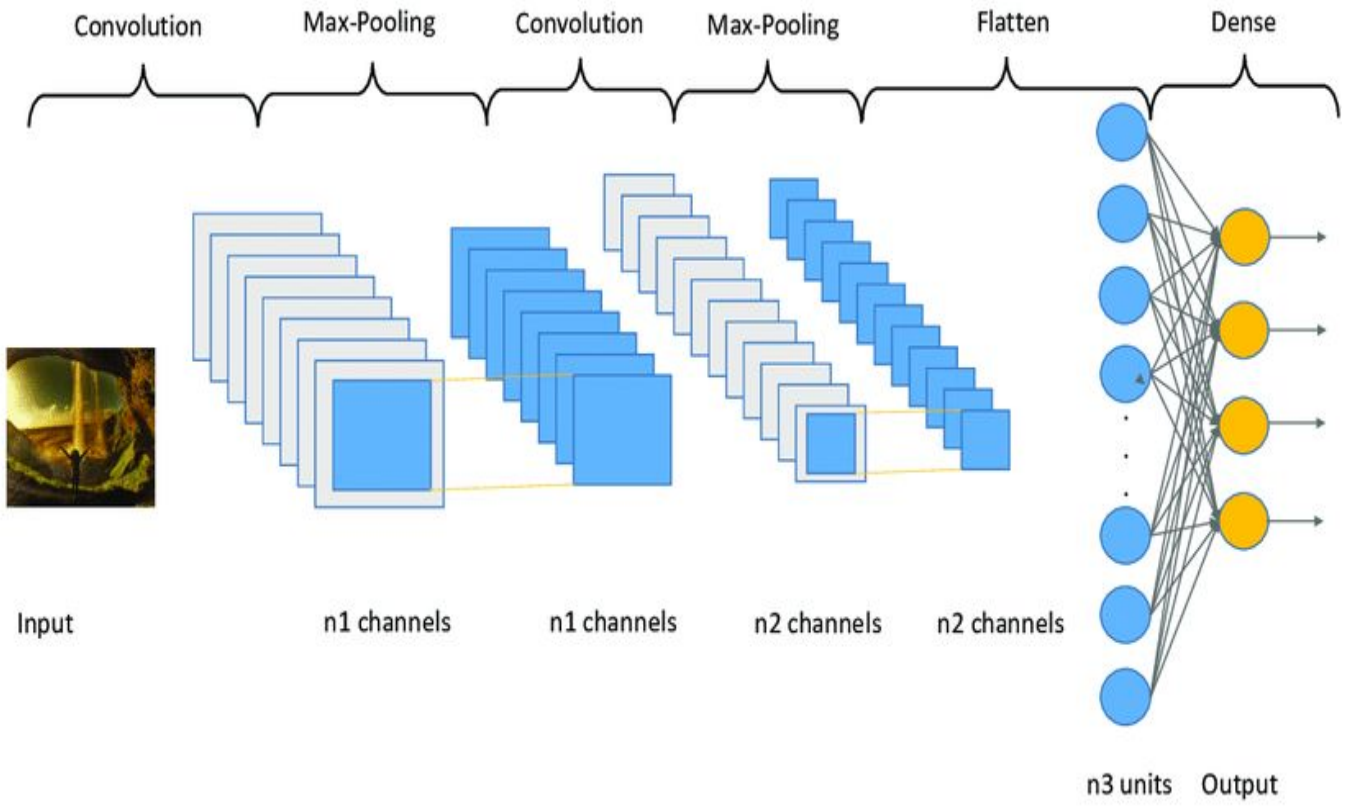








Model Layers

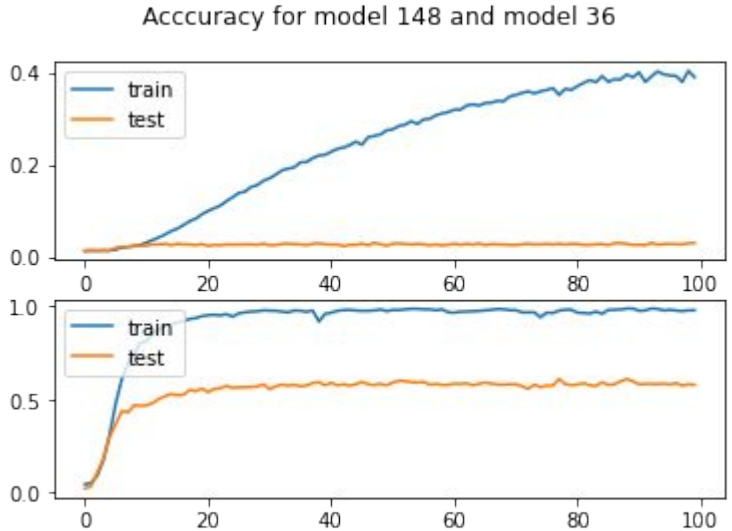


Model Metrics

Accuracy of the models

Metric Measurements

Accuracy of Training and Validation Datasets



Overall Model Performance : Fair and can be improved

Strength Points

Easy to retrain with new datasets

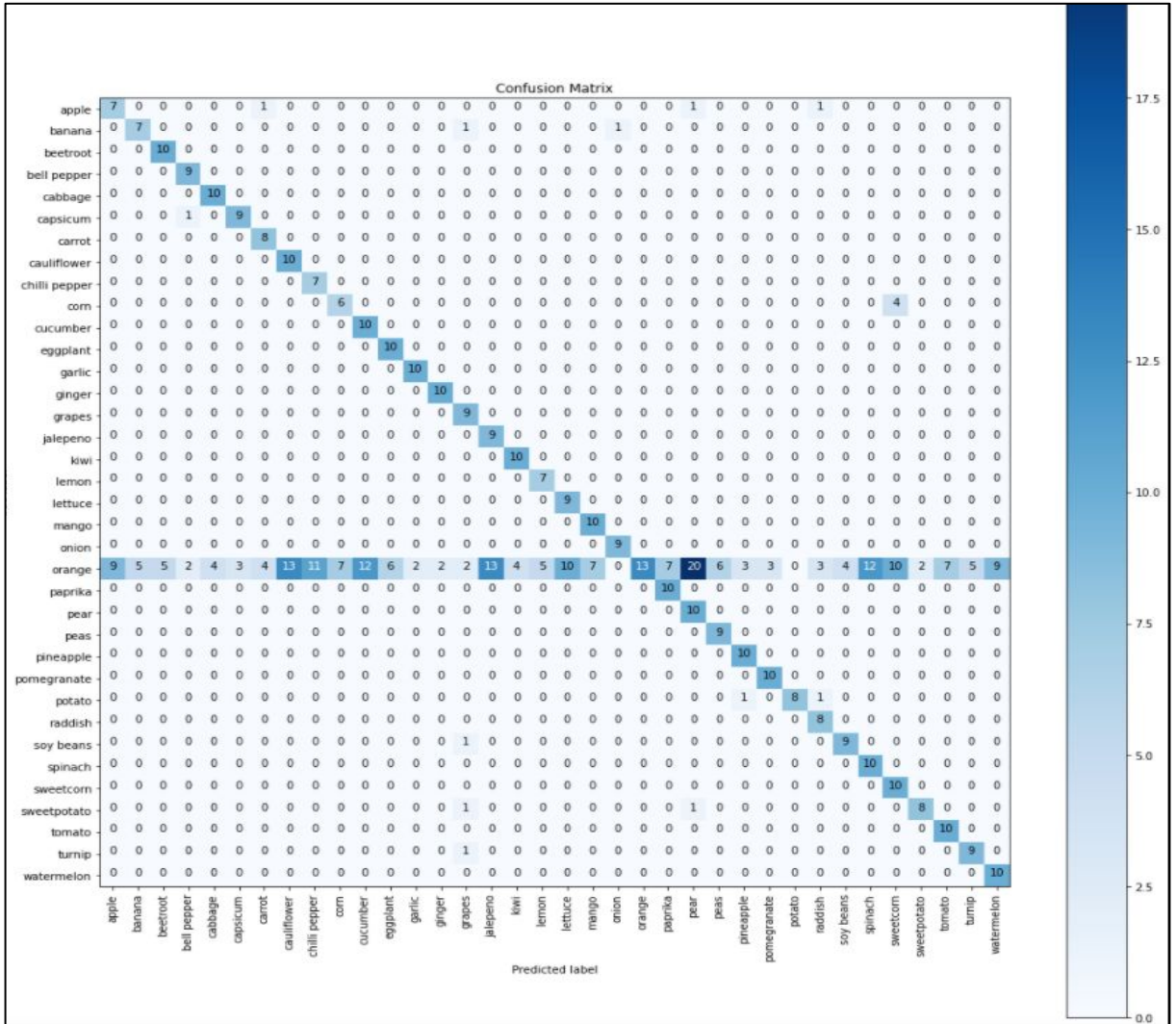
Keras API is very easy to work with

Weakness

Computationally intensive on normal hardware

Model Metrics

Confusion Matrix 36 Classes



Phase 3: Bot Launch

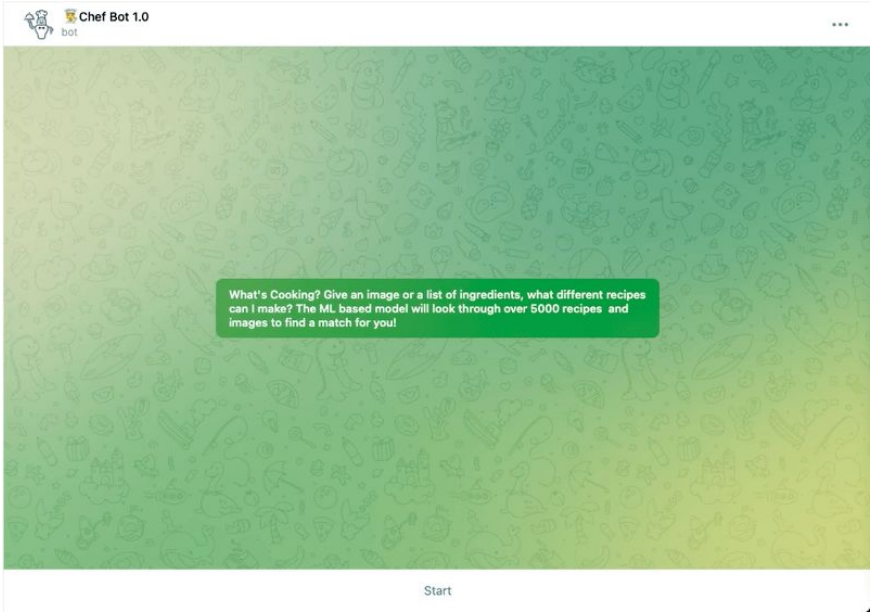
ASU CHEF Bot

Healthy Appetite Quencher

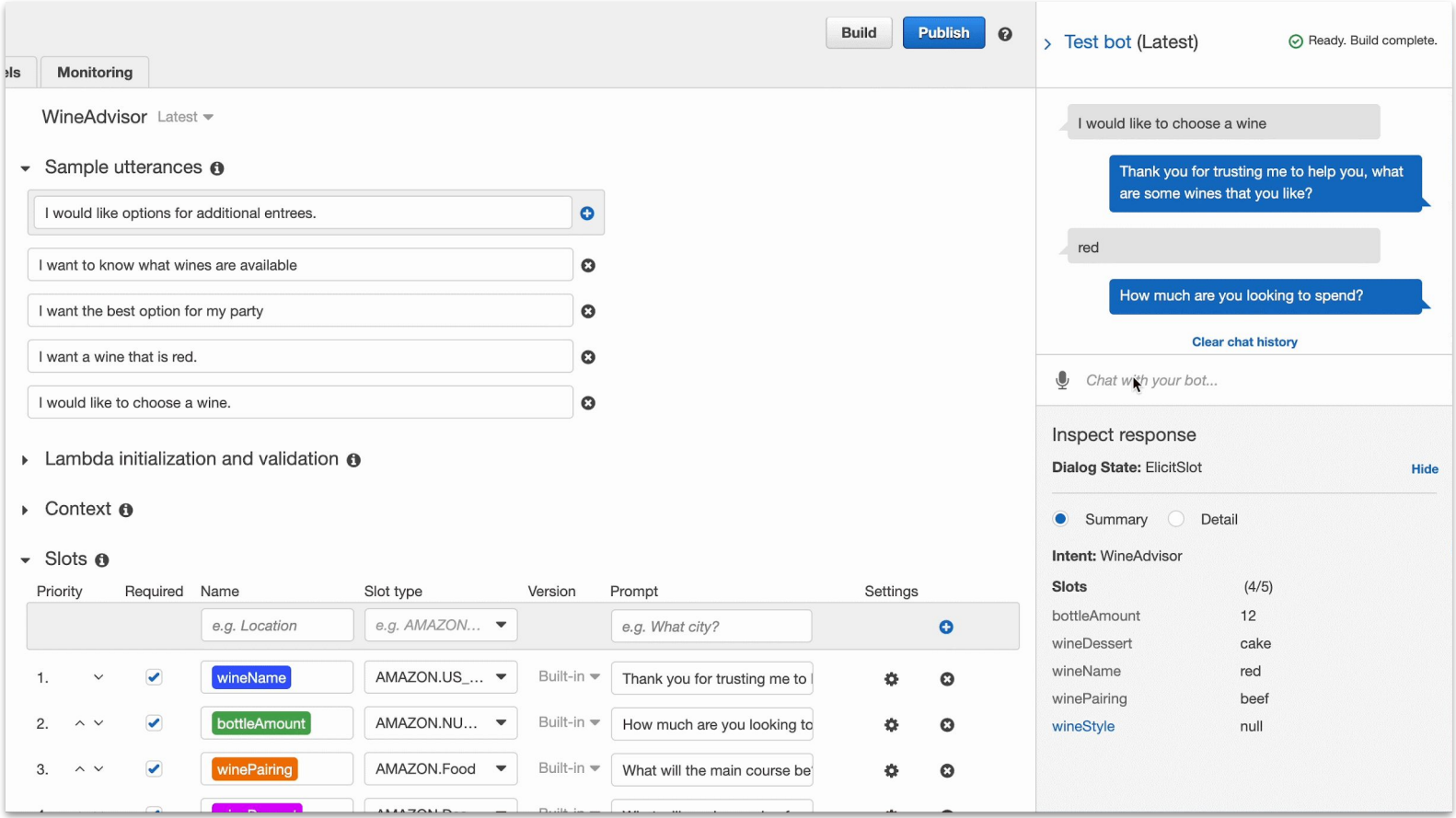
Live Demonstration

Deployment in telegram

Welcome to our Beta Chef bot!



Amazon Lex Initial Development



Phase 4: Future Scope

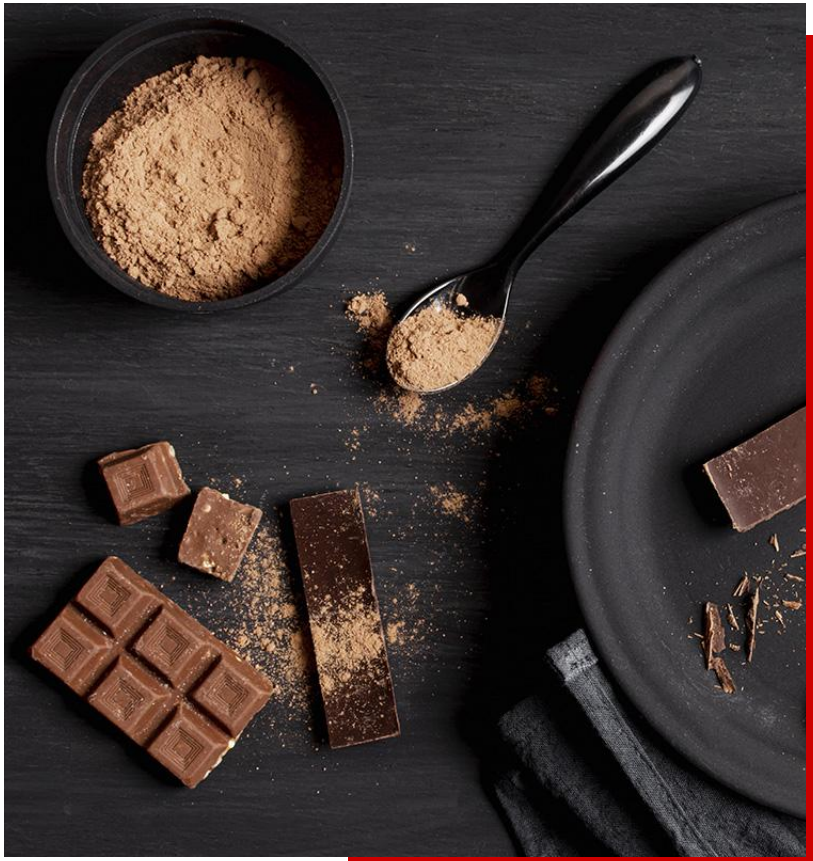
Links to Application and GitHub Repo:

https://github.com/shanelk1/Recipe_recommendation_bot/

https://telegram.org/ASU_Chef_Bot/

Future Value Proposition

- Budgeting
- Advertising and Sales for retailers
- Convenience



Thank You!

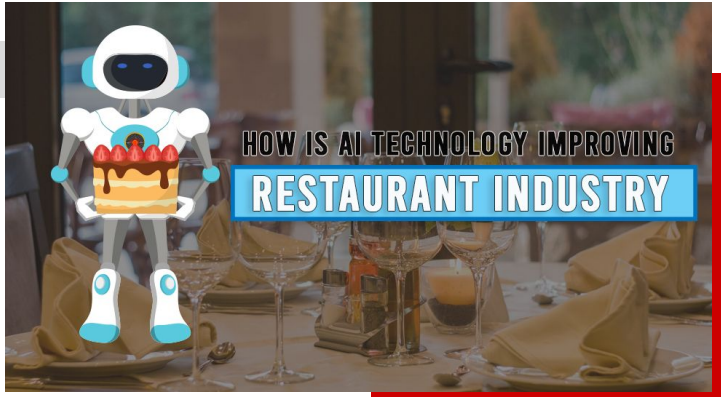
Any questions?

Resources

Project repositories and app:

https://github.com/shanelk1/Recipe_recommendation_bot

https://telegram.org/ASU_Chef_Bot



Cited Sources:

- Start Up Capital
- Investor Sign Up
- Advertising Sales
- Public Offering of Technology

Fonts & colors used

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