Harvest.io

Recommendation System for Farmers

Azure GenAI Hackathon

Names:
Faisal, Siva, Syrin, Umar

Table of contents

Problem Statement

1. Difficulty making quality decisions for optimal farming practices.
2. Limited tools to diagnose plant diseases effectively.
3. Lack of accessible, real-time advice for improving crop health and yield.
4. High Level of Required Tribal Knowledge in Farming Practices
5. Research backed farming advice is not readily available

Impact:

1. Reduced productivity
2. Increased losses due to delayed or incorrect decisions.
3. High barrier of entry for new farmers

02 Features & Architecture

Vision Based Disease Detection

Goal :

- Help Farmers identify different diseases that affect their Crop in order to find solutions

Approach :

- Utilize Azure AI Custom Vision
- Finetune the image detection capabilities of AI vision to be focused on identifying diseases within crops
- Finetune the model to detect Healthy Crops

Resources :

- Kaggle Dataset CCMT: https://www.kaggle.com/datasets/armaanoajay/ccmt-crop-pest-and-disease-detection

RAG Tuned ChatBot

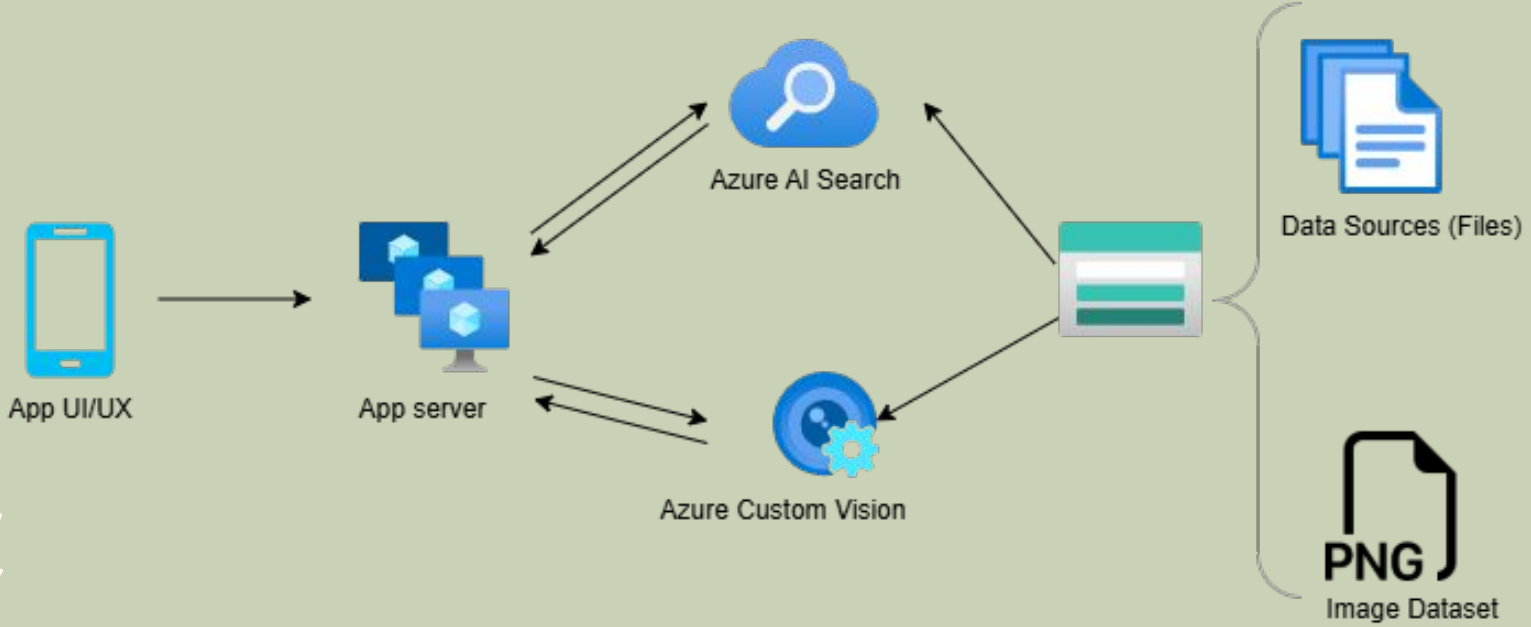
Goal :

- Provide farmers with quality information that would assist them in improving the overall crop yield based on their scenario

Approach :

- Extract relevant research papers that could provide valuable insights
- Convert the Research Papers into a simplified JSON format using a script
- Utilise Azure AI Search to Index the documents to be a readable format
- Utilise Azure AI Search to Augment the results of your chatbot

Technology Architecture

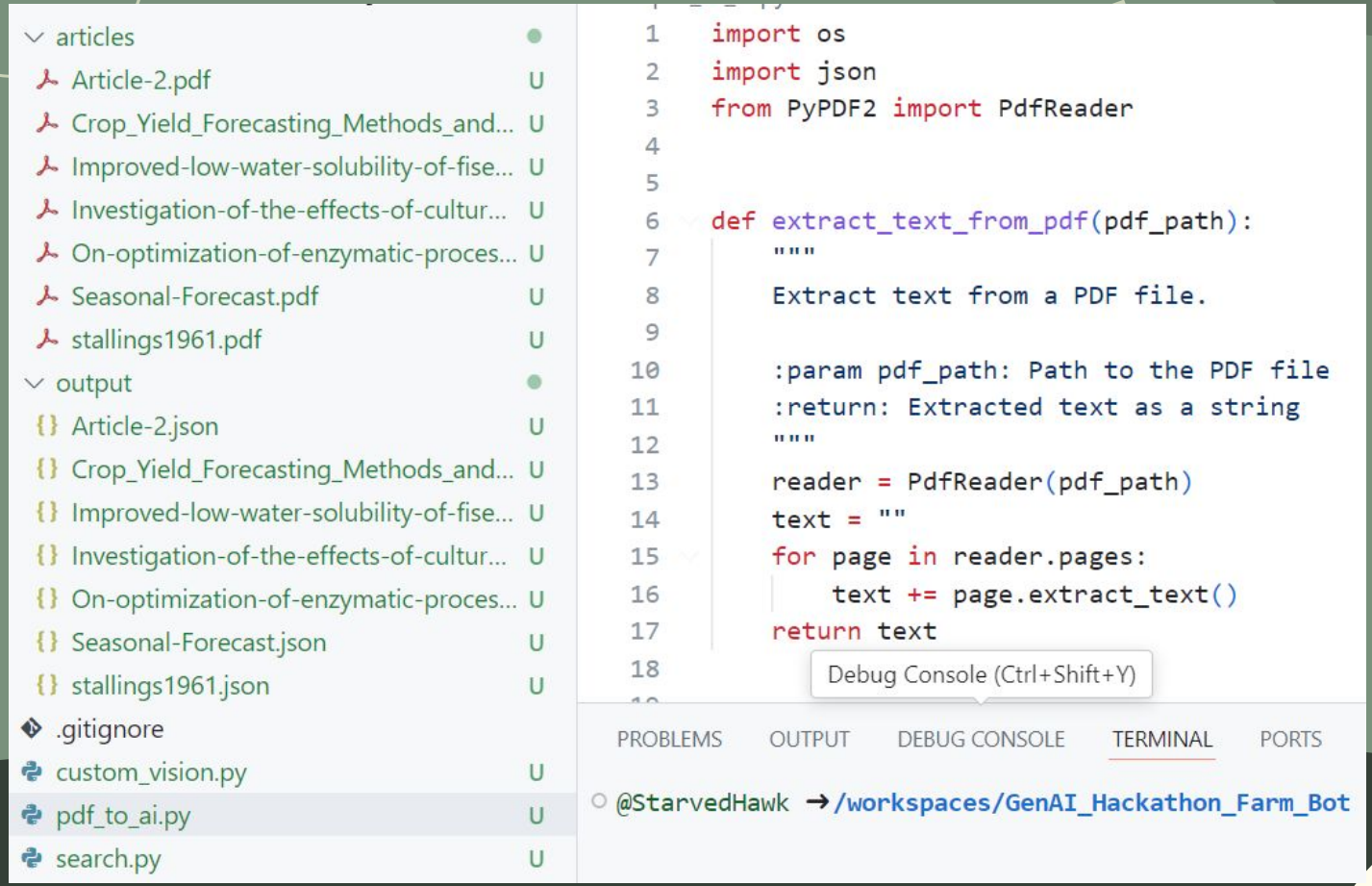


Our MVP

Minimal Viable Product

03

Data Conversion



Home > Azure AI services | AI Search > faisal-azure-ai-search-test | Indexes >

azureblob-index

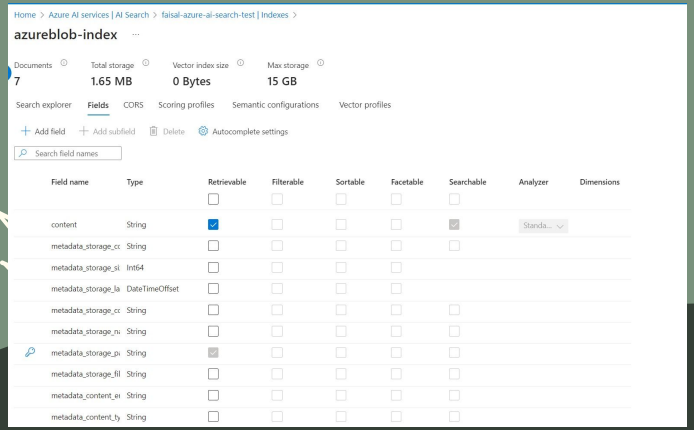
Save | Discard | Refresh | Create demo app | Edit JSON | Delete | Encryption

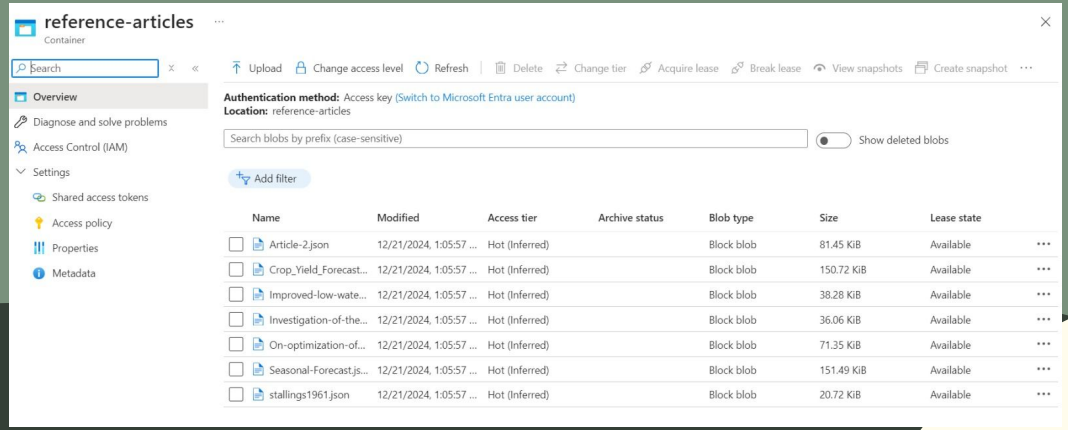
Documents	Total storage	Vector index size	Max storage
7	1.65 MB	0 Bytes	15 GB

Search explorer | Fields | CORS | Scoring profiles | **Semantic configurations** | Vector profiles

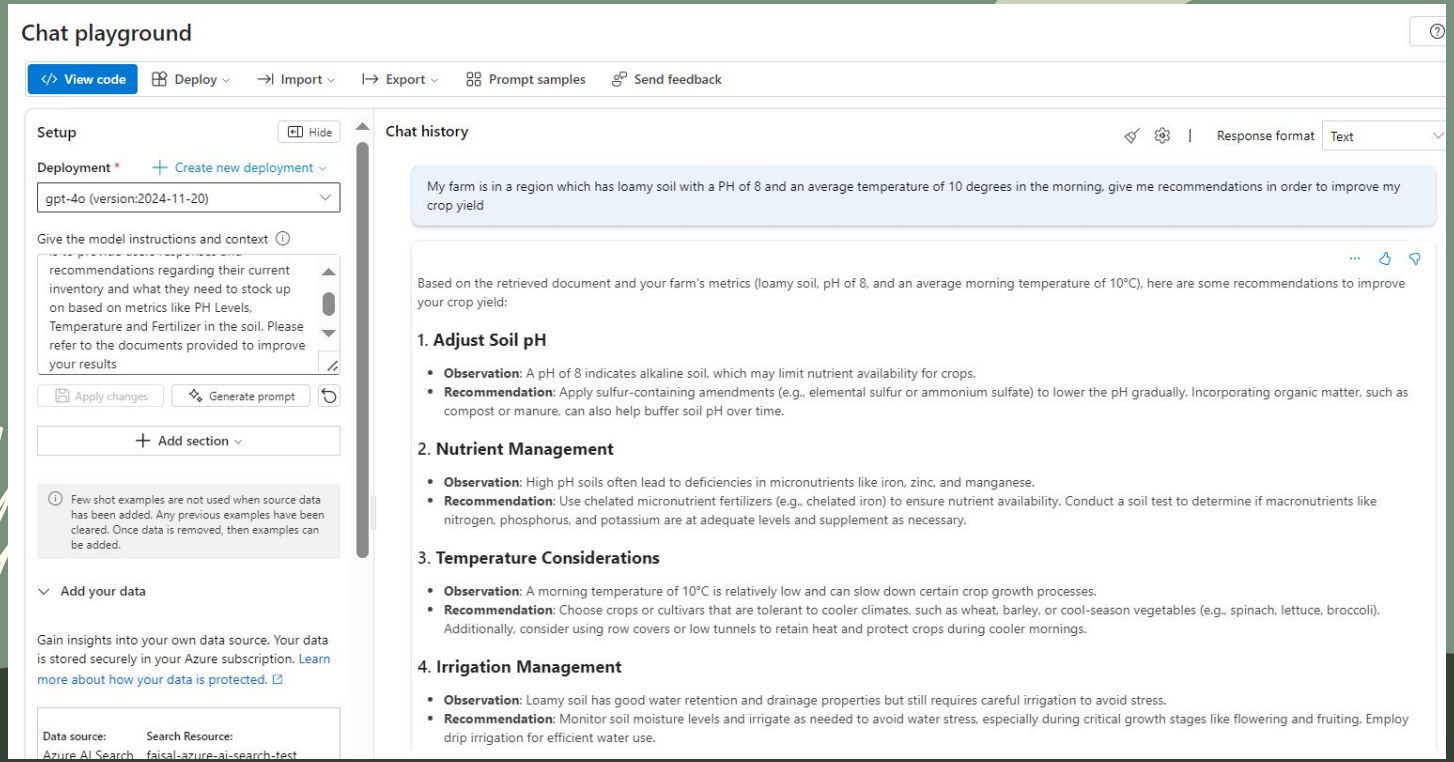
Add semantic configuration | Delete

Name	Title field	Content fields	Keyword fields
Temperature	Add title field	content, keyphrases, sentiment	keyphrases





The Chatbot


Chat playground
View code
Deploy
Import
Export
Prompt samples
Send feedback
Setup
Hide
Deployment *
Create new deployment
gpt-4o (version:2024-11-20)
Give the model instructions and context
recommendations regarding their current inventory and what they need to stock up on based on metrics like PH Levels, Temperature and Fertilizer in the soil. Please refer to the documents provided to improve your results
Apply changes
Generate prompt
Add section
Few shot examples are not used when source data has been added. Any previous examples have been cleared. Once data is removed, then examples can be added.
Add your data
Gain insights into your own data source. Your data is stored securely in your Azure subscription. Learn more about how your data is protected.
Data source:
Azure AI Search
Search Resource:
faisal-azure-ai-search-test
Chat history
Response format
Text
My farm is in a region which has loamy soil with a PH of 8 and an average temperature of 10 degrees in the morning, give me recommendations in order to improve my crop yield
Based on the retrieved document and your farm's metrics (loamy soil, pH of 8, and an average morning temperature of 10°C), here are some recommendations to improve your crop yield:
1. Adjust Soil pH
Observation: A pH of 8 indicates alkaline soil, which may limit nutrient availability for crops.
Recommendation: Apply sulfur-containing amendments (e.g., elemental sulfur or ammonium sulfate) to lower the pH gradually. Incorporating organic matter, such as compost or manure, can also help buffer soil pH over time.
2. Nutrient Management
Observation: High pH soils often lead to deficiencies in micronutrients like iron, zinc, and manganese.
Recommendation: Use chelated micronutrient fertilizers (e.g., chelated iron) to ensure nutrient availability. Conduct a soil test to determine if macronutrients like nitrogen, phosphorus, and potassium are at adequate levels and supplement as necessary.
3. Temperature Considerations
Observation: A morning temperature of 10°C is relatively low and can slow down certain crop growth processes.
Recommendation: Choose crops or cultivars that are tolerant to cooler climates, such as wheat, barley, or cool-season vegetables (e.g., spinach, lettuce, broccoli). Additionally, consider using row covers or low tunnels to retain heat and protect crops during cooler mornings.
4. Irrigation Management
Observation: Loamy soil has good water retention and drainage properties but still requires careful irrigation to avoid stress.
Recommendation: Monitor soil moisture levels and irrigate as needed to avoid water stress, especially during critical growth stages like flowering and fruiting. Employ drip irrigation for efficient water use.

Disease Vision

Detected attributes JSON

miaze_leaf_blight (99.96%)
maize_leaf_spot (0.04%)
maize_healthy (0.00%)

Detected attributes JSON

maize_leaf_spot (99.98%)
miaze_leaf_blight (0.02%)
maize_healthy (0.01%)

MAIZE IMAGE ANALYSIS

Health Status: Healthy
Confidence: 99.0%
Analysis: Leaf appears to be healthy
Detected Features: green, outdoor, terrestrial plant, grass, plant stem, vascular plant, leaf, plant

The Dashboard

Conclusion 04

Impact

1. Enhanced Decision-Making
   a. Automatic and Early Plant Disease Detection
2. Time Efficiency
   a. Instant Results
   b. Reduced Dependency on Experts
3. Cost Reduction
   a. Reduction in Input costs (fertilizers, pesticides)
   b. Better Resource Allocation
4. Improved Crop Yield and Quality
   a. Better Crop Management
   b. Improved Quality of Produce
5. Data-driven and Research-based insights
   a. Collection of Plant Health Data

Future Work

Including more crop types to analyze and detect.

More Crops

Enhance different aspects such as accuracy, compactability, specificity, and dynamics.

Better Features

Improve the Database of knowledge that is utilised to deliver the required information

Inclusion

Thanks!

CREDITS: This presentation template was created by **Slidesgo** , including icons by **Flaticon** , infographics & images by **Freepik**