Leveraging Azure OpenAI for Intelligent Content Solutions

Igniting Innovation

Drupal GovCon 2024
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Thank you!
Introduction

• American Institutes for Research (AIR): https://www.air.org
  o The American Institutes for Research® (AIR) is a nonpartisan, not-for-profit organization that conducts behavioral and social science research and delivers technical assistance to solve some of the most urgent challenges in the U.S. and around the world.
  o AIR's mission is to generate and use rigorous evidence that contributes to a better, more equitable world.

• Technology Solutions – Applied Software Engineering – Drupal Team: https://www.air.org/drupal
  o Anand Kumar
  o Matt Decker
  o Volodymyr Mostepaniuk
Agenda

• Overview of Microsoft Azure OpenAI
• Use Cases
• Challenges and Solutions
• Drupal AI Community Initiative
• Gen AI Integration with Drupal
• Screenshot Demonstrations
• Q&A
Overview of Azure OpenAI

Azure OpenAI Service
- REST API access to OpenAI's language models (GPT-4o, Embeddings, DALL-E, Whisper)


Private networking

Regional availability

Responsible AI content filtering

Azure AI Services
- Azure AI: Search, Content Safety, Translator, Speech, Vision, Language, Document Intelligence
Azure OpenAI Chat Playground

Assistant setup
- System message
- Add your data (preview)
- Save changes

Specify how the chat should act
Use a template to get started, or just start writing your own system message below. Want some tips? Learn more

Use a system message template
Select a template

System message
You are an AI assistant that helps people find information.

Examples
Add examples to show the chat what responses you want. It will try to mimic any responses you add here so make sure they match the rules you laid out in the system message.

Chat session
- Clear chat
- View code
- Show raw JSON

Chatgpt-playground-load.png

Azure OpenAI DALL-E Playground

Use Cases

**Content generation and enhancement**

- **Content creation and modification**
  - Generate initial drafts of web content, press releases, news articles, policy documents
  - Produce images using services like DALL-E
  - Revise drafts, improve language, ensure consistency

- **Content summarization**
  - Condense policy documents, reports, legislative texts into concise versions for easier public consumption
  - Summarize and synthesize comment threads to extract key insights and trends

- **Multilingual content**
  - Provide translations for non-English speaking communities to enhance accessibility and inclusivity

- **Automated Content Classification**
  - Generate taxonomies and auto-classify content
Use Cases (Continued)

Content moderation and quality assurance

• Automated content review
  o Moderate user-generated content
  o Prevent inappropriate or harmful content
• Quality assurance
  o Generate recommendations for improving the readability, accessibility, and SEO of web content

Enhanced search and discovery

• Intelligent search
  o Implement AI-powered search that understand natural language queries to provide more accurate and relevant results
• Content discovery
  o Use AI to recommend related content and services
Use Cases (Continued)

Accessibility and inclusivity

- Automated transcription
  - Convert audio and video content into text for hearing-impaired users
- Content adaptation
  - Adapt content for users with different needs, such as simplifying text for those with cognitive disabilities

Data analysis and insights

- Sentiment analysis
  - Monitor sentiment and feedback to gauge opinion on various initiatives
## Challenges and Solutions

<table>
<thead>
<tr>
<th>Quality and Accuracy of Generated Outputs</th>
<th>Design and refine prompts to reduce ambiguities (prompt tuning)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Implement robust evaluation metrics to assess output quality</td>
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<td>Combine automated and human reviews to maintain high standards</td>
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<td>Implement human-in-the-loop processes for continuous oversight</td>
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<td></td>
<td>Utilize Retrieval Augmented Generation (RAG) with your own data</td>
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<tr>
<td></td>
<td>Implement knowledge graphs for contextual accuracy</td>
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<tr>
<td>Bias and Ethical Concerns</td>
<td>Use bias detection and mitigation techniques</td>
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<td>Apply Microsoft Customer Copyright Commitment required mitigations</td>
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<td>Create and enforce a code of ethics</td>
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<td>Establish review board to monitor AI development</td>
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<td>Engage stakeholders in ongoing ethical discussions</td>
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<td>Conduct regular audits to ensure compliance</td>
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</table>
# Challenges and Solutions (continued)

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
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<tbody>
<tr>
<td>Data privacy and security</td>
<td>Implement robust data governance policies</td>
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<td>Anonymize and preprocess data to remove sensitive information</td>
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<tr>
<td>Explainability &amp; transparency</td>
<td>Implement Explainable AI (XAI) techniques</td>
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<td>Provide clear and comprehensive documentation</td>
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<td></td>
<td>Regularly monitor and evaluate models</td>
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<tr>
<td>Data Relevance &amp; Latency</td>
<td>Implement systems that support real-time data processing and integration</td>
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<td>Utilize data architectures that minimize latency</td>
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<tr>
<td>Vulnerabilities</td>
<td>Identify and address top vulnerabilities in LLMs (ex. OWASP Top 10 for LLMs)</td>
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<td>Stay informed about emerging threats</td>
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</tbody>
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The Rise of AI in Drupal

- The Drupal OpenAI module was released within two months of ChatGPT's launch
- To date, over 100 AI-related modules have been developed in the last two years
Key Modules for Implementing AI in Drupal

• OpenAI / ChatGPT Integration (openai)

• Augmentor AI (augmentor)

• AI Interpolator (ai_interpolator)
OpenAI / ChatGPT Integration

• Perform multiple text operations within CKEditor 5:
  o Generate, rewrite, summarize, translate, adjust tone, and more

• Leverage additional features:
  o DALL-E, embeddings, text-to-speech, and speech-to-text

• Integrate with the ECA module for custom actions and workflows

• Limited to OpenAI, with costs incurred for each API call

• Recently deprecated in favor of the AI module
Augmentor AI

• An AI framework that allows easy integration of multiple AI services

• An ecosystem of related modules provides integrations with around 10 AI services: OpenAI, NLP Cloud, Google, AWS and more
  o [https://www.drupal.org/project/augmentor/ecosystem](https://www.drupal.org/project/augmentor/ecosystem)

• Configure augmentors in the UI with predefined prompts, service-specific configurations for desired results

• Use multiple AI services or create multiple variations for a single AI service

• Add field and select widget, chose source field(s) to be included in prompt and select destination field to save result

• Or activate augmentors as buttons in CKEditor
AI Interpolator

- A powerful no-code solution allows you to set up any AI workflow
- Works with multiple AI services and has an ecosystem with 25 modules
  [https://www.drupal.org/project/ai_interpolator/ecosystem](https://www.drupal.org/project/ai_interpolator/ecosystem)
- Transform and generate content across different fields
- Workflows of AI videos:
  [https://workflows-of-ai.com](https://workflows-of-ai.com)
- Recently deprecated in favor of the AI module
There’s Much More

Challenges:

- Duplication of contribution efforts
- Difficulty in deciding which module to use
- Limited documentation
- Version stability
- Future maintenance of all these modules
Drupal AI Community Initiative

• Press release
  o On June 19, 2024, FreelyGive announced "A New AI Initiative in Drupal."
  o "Our aim is to consolidate the best features of the contributed modules into a solid AI foundation for Drupal that provides a great out of the box experience for site builders and makes it easy to work with popular providers like OpenAI, HuggingFace, Claude, Mistral or Ollama to name a few."

• AI Community Initiative Project page
  https://www.drupal.org/project/artificial_intelligence_initiative

• OpenAI and AI Interpolator are deprecated

• One solution:
  o https://www.drupal.org/project/ai
Drupal "AI" Mega Module

• Robust abstraction layer for using and swapping various AI models
• Most features from OpenAI and AI Interpolator are already included
• Powerful prompt testing tool
• Intelligent AI search functionality
• One-click AI-powered translations
• Preparing AI features for the Starshot initiative
Azure OpenAI in Drupal

- **AI Module**
  - The Azure OpenAI provider implementation is in progress, but it's already functioning for Chat and Image generation operations. Other operations need further testing.

- **Augmentor**
  - Integration with Azure OpenAI is available for the Completions operation.
  - **Azure OpenAI Augmentor** [https://www.drupal.org/project/augmentor_azure_openai](https://www.drupal.org/project/augmentor_azure_openai)
  - To enhance functionality, we contributed an additional Chat Augmentor, which was included in the latest release last week.

- **Deprecations**
  - OpenAI / ChatGPT
  - AI Interpolator
Get Involved

• Testing and Feedback
  o Try out and test the Drupal AI module (Azure OpenAI provider)

• Project Innovation
  o Build AI solutions into your Drupal projects

• Contribute Back
  o Consider contributing to code, tests, discussions or simply share your innovative ideas

• Join the Conversation
  o Drupal #ai Slack: https://drupal.slack.com/channels/ai

• Stay Informed
  o Subscribe to the Drupal AI Community Newsletter

• Upcoming Event
  o Drupal Camp AI (London, October 2024)
Azure OpenAI Demo — Goals

- Must use Microsoft's Azure OpenAI
- Enable developers to build their own Azure OpenAI powered modules
- Build an AzureOpenAI Service.
- Utilize existing OpenAI PHP connector
  - OpenAI PHP Client
    - [https://github.com/openai-php/client](https://github.com/openai-php/client)
- Extend a simple existing Drupal AI-powered module
  - OpenAI Summary
    - [https://git.drupalcode.org/project/openai_summary](https://git.drupalcode.org/project/openai_summary)
Azure OpenAI Demo — Drupal Setup

- Standard Drupal 10 installation managed via composer

- Composer require openai-php/client

- Install drupal/openai_summary from drupalcode.org

- Build custom azure_openai service via a custom module
  - Expose azure_openai.service: AzureOpenAIService

- Connect openai_summary to AzureOpenAIService
Azure OpenAI Demo — Summary In Action

Create Basic page 🌟

Title *

Body (Edit summary)

Text format Basic HTML

OpenAI Summary
Azure OpenAI Demo — Summary In Action

Title

IGN.com's Star Wars: Episode IV - A New Hope

Body (Edit summary)

A Corellian Corvette named Tantive IV is captured by an Imperial Star Destroyer commanded by Darth Vader. The corvette's diplomat, Princess Leia Organa of Alderaan, is forced to send stolen plans for the planet destroying Death Star down to the nearby planet of Tatooine. Custodians of the plans, R2-D2 and C-3PO are soon sold by Jawas to Owen Lars.

Owen's nephew, Luke Skywalker, discovers Princess Leia's desperate message to Obi-Wan Kenobi within the memory banks of R2-D2. After R2-D2 escapes to deliver his message to Kenobi, Luke and C-3PO give chase. Once reunited, Luke is attacked by Tusken Raiders. Obi-Wan Kenobi thwarts the Tusken Raiders and takes the droids and Luke to his home where he retrieves...
The Corellian Corvette Tantive IV, carrying Princess Leia, is captured by Darth Vader. Leia sends plans for the Death Star to Tatooine with droids R2-D2 and C-3PO, who end up with Luke Skywalker. They meet Obi-Wan Kenobi and team up to deliver the plans to the Rebel Alliance. After Owen and Beru are killed by Imperial Stormtroopers, Luke joins them. They hire Han Solo and escape on the Millennium Falcon. After Alderaan is destroyed, they infiltrate the Death Star, rescue Leia, and escape. The Rebel base plans an attack, and with help from Han, Luke destroys the Death Star.
Azure OpenAI Demo — Service Setup

```php
/**
 * Set the value of client
 *
 * @return self
 */

class AzureOpenAIService
{
    public function setClient()
    {
        $resourceName = $this->getResourceName();
        $deploymentId = $this->getDeploymentId();
        $apiKey = $this->getApiKey();
        $apiVersion = $this->getApiVersion();

        // Guard
        if (!$resourceName || !$deploymentId || !$apiKey || !$apiVersion)
        {
            throw new \Exception('Unable to configure client. Secrets file is not set up properly.');
        }

        // Construct the OpenAI client
        $this->client = OpenAI::factory()
            ->withBaseUri("https://$resourceName.openai.azure.com/openai/deployments/$deploymentId")
            ->withHttpHeader('api-key', $apiKey)
            ->withRequestParam('api-version', $apiVersion)
            ->make();

        return $this;
    }
}
Azure OpenAI Demo — Service Setup

```php
public function request($prompt) {
    try {
        // Prepare client
        $this->setClient();

        $result = $this->client->chat()->create(["
            'model' => 'gpt-4',
            'messages' => [
                ['role' => 'user', 'content' => $prompt],
            ],
        ]);)

        return $result->choices[0]->message->content;
    } catch (Exception $e) {
        return 'Error: ' . $e->getMessage();
    }
}
```
function openai_summary_generate_text_callback(&$form, FormStateInterface $form_state) {
    $response = new AjaxResponse();
    if ($form_state->getValue('body')[0]['value'] != '') {
        // Provide a prompt intro
        $promptIntro = 'Write a summary, with a maximum of 100 words, using Plain Language, with no markup, of the following: ';
        $prompt = strip_tags($form_state->getValue('body')[0]['value']);
        $openaiService = \Drupal::service('openai_summary.openai_summary');
        $openaiService = \Drupal::service('azure_openai.service');
        $generatedText = $openaiService->request($promptIntro . $prompt);
        $form['body']['widget'][0]['summary'][#value'] = ltrim($generatedText);
        $form['body']['#suffix'] = '';
        $response->addCommand(new ReplaceCommand('#edit-body-wrapper', $form['body']));
    } else {
        $form_state->setErrorByName('body', t('Please fill in the required field first.'));
        $response->addCommand(new AlertCommand(t('Please fill in the required field first.')));
    }
    return $response;
}
Azure OpenAI Demo — Other Possibilities

The Corellian Corvette Tantive IV, carrying Princess Leia, is captured by Darth Vader. Leia sends plans for the Death Star to Tatooine with droids R2-D2 and C-3PO, who end up with Luke Skywalker. They meet Obi-Wan Kenobi and team up to deliver the plans to the Rebel Alliance. After Owen and Beru are killed by Imperial Stormtroopers, Luke joins them. They hire Han Solo and escape on the Millennium Falcon. After Alderaan is destroyed, they infiltrate the Death Star, rescue Leia, and escape. The Rebel base plans an attack, and with help from Han, Luke destroys the Death Star.

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Text format

Plain text

No HTML tags allowed.

Lines and paragraphs break automatically.

Web page addresses and email addresses turn into links automatically.

AI Review

- **Reading Grade Level**: This content is likely to be at a middle school to high school reading level.
- **Harmful Language**: The content does not contain any harmful language.
- **Inappropriate Language**: The text does not contain inappropriate language for children.
TECHNOLOGY SOLUTIONS – APPLIED SOFTWARE ENGINEERING – DRUPAL TEAM

Contact Us: drupal@air.org

Slide Deck: https://www.air.org/drupalgovcon2024

GitHub Repository: https://github.com/American-Institutes-for-Research/drupal_aoi_integration