

# Project 3 Report

Azure Generative AI Engineer Nanodegree (Udacity)

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## 1 Executive Summary

This document captures the full end-to-end run of the Customer Complaint Classification pipeline executed on November 15, 2025 using the provided `Coffee.m4a` audio clip. The workflow leverages Azure OpenAI Whisper for transcription, GPT-4o for multimodal reasoning, and a dedicated DALL-E 3 deployment hosted on the `incperf-openai` resource in `eastus`. All intermediate artifacts referenced below live in the `output/` directory of the repository.

## 2 Workflow Overview

The pipeline orchestrated by `main.py` performed the following major steps:

**Step 1: Transcription** — Whisper converted the spoken complaint into plain text.

**Step 2: Prompt Engineering** — The transcript was transformed into a detailed prompt for image generation.

**Step 3: Image Generation** — DALL-E 3 produced a synthetic depiction of the reported issue via the `incperf-openai` endpoint.

**Step 4: Vision Analysis** — GPT-4o Vision described the generated image and highlighted the malfunction.

**Step 5: Annotation** — The critical region was emphasized on top of the generated asset.

**Step 6: Classification** — GPT-4o categorized the complaint into the rubric-approved taxonomy.

## 3 Output Artifacts

Table 1 enumerates every file created during this run.

extbfFile	Description
output/transcription.txt	Whisper transcript of Coffee.m4a.
output/image_prompt.txt	Prompt issued to DALL-E 3.
output/generated_image.png	Raw DALL-E render of the malfunctioning coffee maker.
output/annotated_image.png	Vision model annotation highlighting the spill zone.
output/image_description.txt	GPT-4o Vision narrative of the generated image.
output/classification.txt	Human-readable category assignment.
output/classification.json	Structured classification payload.
output/workflow_summary.json	Aggregated record of all intermediate results.

Table 1: Artifacts produced by the Coffee.m4a run.

## 4 Detailed Results

### 4.1 Transcription

The coffee maker is leaking water from the bottom.

### 4.2 Image Generation Prompt

A realistic photo showing: The coffee maker is leaking water from the bottom.. Focus on showing the product and the specific issue or problem mentioned. Make it clear and detailed.

### 4.3 Vision Description

The image depicts a modern coffee maker with a glass carafe, positioned on a kitchen countertop with a tiled backsplash in the background. The coffee maker appears to be actively brewing or has recently brewed coffee. However, there is a visible issue: liquid coffee is overflowing from the carafe and trickling down onto the base of the machine, spreading across the countertop.

#### Visible Problems and Defects:

- Overflowing Coffee — The carafe is clearly overfilled, leading to coffee spilling out.
- Accumulation and Spillage — The spilled coffee has pooled onto the countertop, suggesting leaks.
- Moisture on the Carafe — Condensation hints at steam escaping because of improper sealing.

**Potential Causes:**

- Broken or malfunctioning drip-stop mechanism.
- Incorrectly positioned carafe or user error.
- Damaged or cracked carafe.

**Suggestions:**

- Inspect and service the stop-brew mechanism and seals.
- Realign the carafe and respect fill limits.
- Clean spills promptly and re-test the appliance.

**4.4 Classification**

Category: Home & Kitchen

Subcategory: Appliances

Reasoning: The complaint involves a coffee maker, which is a kitchen appliance. The issue described pertains to malfunctioning due to leaking water and overflowing coffee, making “Appliances” the most appropriate subcategory within “Home & Kitchen.”

## 5 Visual Evidence



Figure 1: DALL-E 3 rendering of the leaking coffee maker.



Figure 2: Annotated visualization with the spill region highlighted.

## 6 Appendix: Workflow Summary JSON

The serialized record below mirrors `output/workflow_summary.json` for traceability.

```
{
  "timestamp": "2025-11-15T08:11:11.019757",
  "workflow_steps": {
    "1_transcription": "The coffee maker is leaking water from the bottom.",
    "2_image_prompt": "A realistic photo showing: The coffee maker is leaking water from the bottom.",
    "3_generated_image_path": "output\\generated_image.png",
    "4_image_description": "The image depicts a modern coffee maker with a glass carafe, positioned on a kitchen countertop with a tiled backsplash in the background.",
    "5_classification": {
      "category": "Home & Kitchen",
      "subcategory": "Appliances",
      "reasoning": "The complaint involves a coffee maker, which is a kitchen appliance. The image shows a modern coffee maker with a glass carafe, positioned on a kitchen countertop with a tiled backsplash in the background."
    }
  }
}
```

```
}
```

## 7 Next Steps

Future work will incorporate the remaining `Jacket.m4a` and `Phone.m4a` recordings, expand the report with comparative metrics, and automate PDF generation as part of the rubric validation checklist.