# Abacus AI ContentGen Workflow

## Technical Report

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## 1. Introduction

This report describes an automated pipeline for social media content creation built on the Abacus AI platform. It details each component, model utilization, and integration points.

## 2. Workflow Overview

The pipeline executes the following stages:

• Configuration: load keys and initialize API client.

• Attachment Management: collect and store generated artifacts.

• Caption Generation: research topic(using Abacus API search tools), classify taxonomy, summarize, and produce captions.

• Image Generation: engineer image prompts, generate negative image prompt, and render images via diffusion.

• Packaging: assemble Markdown and JSON outputs along with image files.

## 3. Configuration

Environment variables provide secure credentials. The ApiClient handles authentication and request routing.

```
API_KEY, DEPLOYMENT_ID, DEPLOYMENT_TOKEN = (
 _env('ABACUSAPIKEY'),
 _env('DEPLOYMENT_ID'),
 _env('DEPLOYMENT_TOKEN')
)
client = ApiClient(API_KEY)
```

## 4. Attachment Management

Helper routines ensure all generated content is saved correctly. Functions include:

• _all_attachments(payload): recursive extraction from nested segments.

• _save_bytes(name, data): write binary or text to disk.

• _download(att): handle inline, object store, or HTTP-signed URLs.

## 5. Caption Generation Node

Generates five unique Instagram captions with hashtags and emojis. Implements caching to avoid redundant executions within a 24-hour window.

```
def caption_generator(topic):
 # 1) Research via web search
 # 2) Taxonomy classification
 # 3) Summary and caption production
 # 4) Caching of results
 return AgentResponse(...)
```

## 6. Topic Taxonomy

Classification assigns up to three genres, a tone, a format, and target audiences. The model chooses from varied options across the three categories. Details can be found in the Taxonomy report.

## 7. Summary & Captions

Research snippets inform a concise topic summary. The LLM then produces exactly five captions in JSON format, each tailored to the classified taxonomy and audience.

## 8. Image Generation Node

Transforms captions into detailed scene prompts, generates a global negative prompt, and invokes a diffusion model for each caption. Retries and fallbacks ensure completion. `def image_generator(captions, sentiment, summary, topic):`

```
# Negative prompt via LLM
# Per-caption prompt engineering
# Diffusion calls and error handling
return AgentResponse(...)
```

## 9. Model Utilization

LLMs can be dragged in dropped easily in Abacus.ai. LLama 4 Maverick is available to be deployed within seconds, but stuck to cheaper models due to credit limitations. Five LLM tasks and one diffusion backend are employed:

• Taxonomy Classification: gemini_2_flash

• Topic Summarization: gemini_2_flash

• Caption Generation: gemini_2_flash

• Sentiment Analysis: gemini_2_flash

• Prompt Engineering: gemini_2_flash

• Diffusion Models: stabilityai/stable-diffusion-3.5-large (primary), sdxl-turbo and stable-diffusion-xl-base (fallbacks), mock images.

## 10. Support Utilities

Robust JSON parsing (safe_parse_json), schema validation (_validate_taxonomy), and caching logic guarantee resilience against minor formatting errors or service disruptions.

## 11. Orchestration & Delivery

The agent pipeline executes sequentially, streaming status messages. Final outputs include Markdown reports, JSON data, and image files, accessible as Blobs for downstream consumption.

## 12. Conclusion

This modular pipeline delivers end-to-end social media content automation through Abacus AI, ensuring scalability, maintainability, and clear categorization for efficient deployment. Once deployed through an endpoint, the app is available on our dashboard on Vercel.