Marketing Agents System Documentation

Overview

This system implements a multi-agent marketing campaign assistant using Google's Agent Development Kit (ADK). It orchestrates several specialized agents to create comprehensive marketing campaigns through a sequential workflow.

Executive Summary

The Marketing Agents System is an AI-powered marketing campaign generation platform that automates the entire campaign development process from initial market research to final campaign brief delivery. By leveraging Google's Generative AI capabilities and a multi-agent architecture, the system delivers professional-quality marketing campaigns in minutes rather than days.

The platform employs five specialized AI agents working in sequence: Market Research, Messaging Strategy, Ad Copy Writing, Visual Concept Development, and Campaign Brief Formatting. Each agent is optimized for its specific domain expertise, ensuring high-quality outputs at every stage of the campaign development process.

Key Value Propositions

Accelerated Campaign Development

- **Speed Improvement**: Complete campaign development in minutes vs. traditional weeks
- **Automated Workflow**: Eliminates manual handoffs between marketing disciplines
- **Consistent Quality**: Maintains professional standards across all campaign elements

Specialized Expertise

- **Domain-Specific Agents**: Each agent optimized for specific marketing functions
- **Research-Driven Approach**: Market research agent provides data-backed insights
- **Creative Diversity**: Multiple ad copy variations and visual concepts generated

Architecture

The system follows a hierarchical agent pattern where a root orchestrator agent coordinates multiple specialized sub-agents, each responsible for a specific aspect of marketing campaign.

Configuration

Environment Setup

The system uses environment variables for configuration with fallback defaults:

```
# Environment variable loading with fallback mechanism
try:
    from dotenv import load_dotenv
    load_dotenv()
    MODEL_NAME = os.environ.get("GOOGLE_GENAI_MODEL", "gemini-2.0-flash")
except ImportError:
    print("Warning: python-dotenv not installed. Ensure API key is set")
    MODEL_NAME = "gemini-2.0-flash"
```

Environment Variables:

- `GOOGLE_GENAI_MODEL` : Specifies the Google Generative AI model (default: “gemini-2.0-flash”)

Core Components

1. ToolRegistry Class

A utility class that manages tool integrations for the agents.

python

```python
class ToolRegistry:
    @staticmethod
    def get_research_tools():
        return [google_search]
```

Purpose: Centralizes tool management and makes it easy to add new tools or modify existing ones.

Methods:

- `get_research_tools()` : Returns a list of research-related tools (currently includes Google Search)

2. MarketingLlmAgent Class

A specialized LLM agent that extends the base `LlmAgent` class with marketing-specific configurations.

```python
class MarketingLlmAgent(LlmAgent):
    def __init__(self, name, instruction, output_key, tools=None):
        super().__init__(
            name=name,
            model=MODEL_NAME,
            instruction=instruction,
            output_key=output_key,
            tools=tools or []
        )
```

Parameters:

- `name` : Unique identifier for the agent
- `instruction` : System prompt/instruction for the agent's behavior
- `output_key` : Key used to store the agent's output in the workflow
- `tools` : Optional list of tools the agent can use

Agent Instances

1. Market Research Agent

- **Name:** MarketResearcher
- **Purpose:** Conducts market research using available tools
- **Tools:** Google Search
- **Output Key:** market_research_summary

2. Messaging Strategist Agent

- **Name:** MessagingStrategist
- **Purpose:** Develops key messaging strategies based on research
- **Tools:** None
- **Output Key:** key_messaging

3. Ad Copy Writer Agent

- **Name:** AdCopyWriter
- **Purpose:** Creates advertising copy variations
- **Tools:** None
- **Output Key:** ad_copy_variations

4. Visual Suggester Agent

- **Name:** VisualSuggester
- **Purpose:** Suggests visual concepts for campaigns
- **Tools:** None
- **Output Key:** visual_concepts

5. Formatter Agent

- **Name:** CampaignBriefFormatter
- **Purpose:** Formats final campaign brief
- **Tools:** None
- **Output Key:** final_campaign_brief

Workflow Orchestration

Campaign Orchestrator

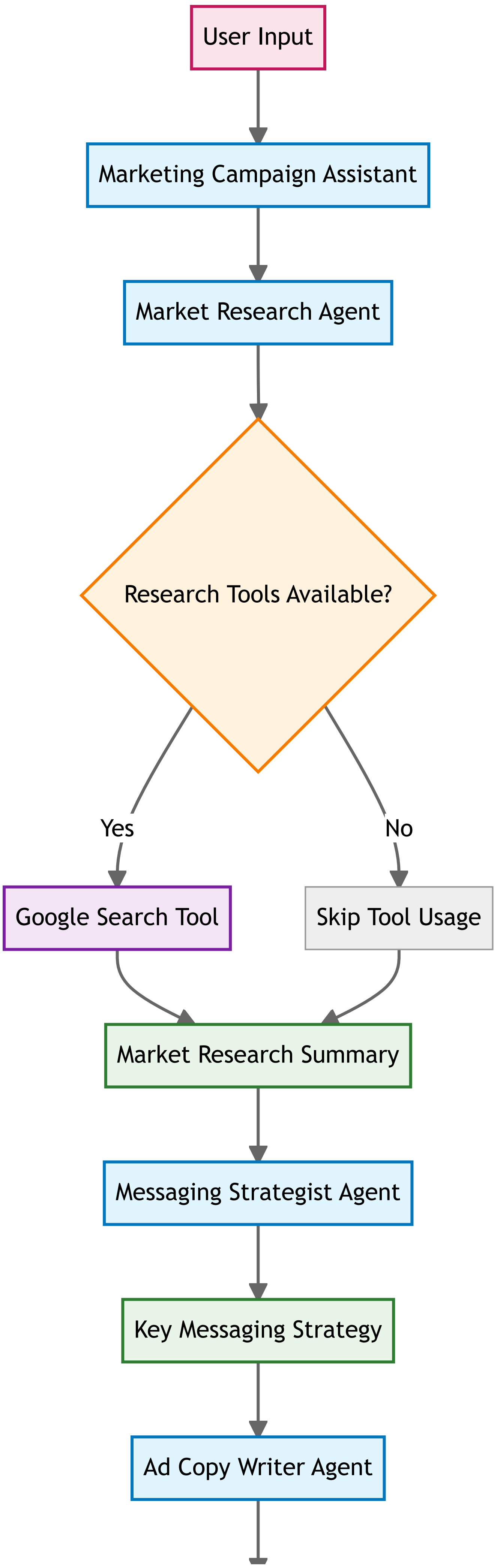
The `campaign_orchestrator` is a `SequentialAgent` that coordinates all sub-agents in a specific order:

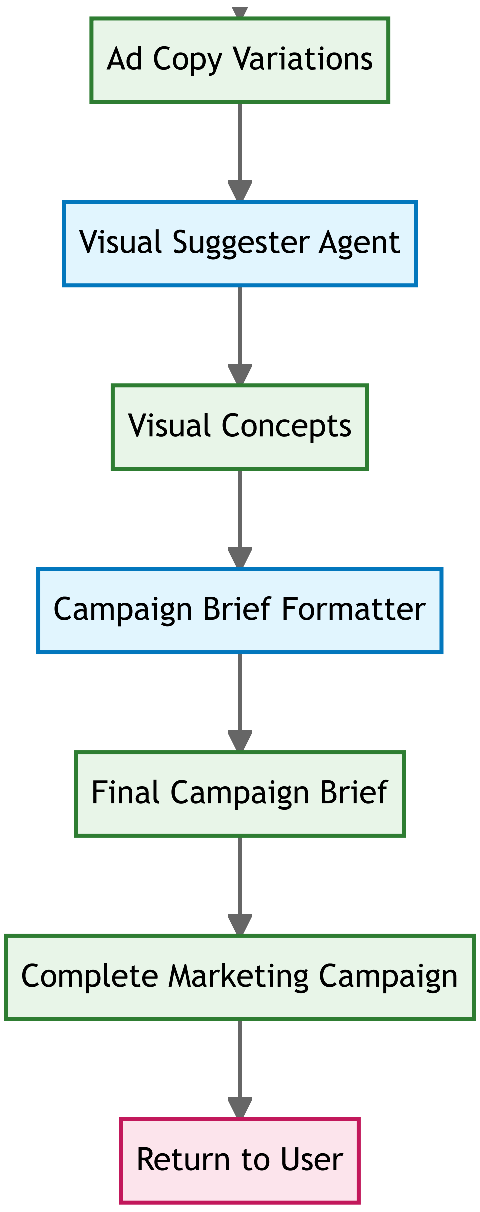
1. **Market Research** → Gathers market intelligence
2. **Messaging Strategy** → Develops key messaging
3. **Ad Copy Writing** → Creates advertisement copy
4. **Visual Suggestions** → Proposes visual concepts
5. **Formatting** → Produces final campaign brief

python

```python
campaign_orchestrator = SequentialAgent(
    name="MarketingCampaignAssistant",
    description=CAMPAIGN_ORCHESTRATOR_INSTRUCTION,
    sub_agents=[
        market_research_agent,
        messaging_strategist_agent,
        ad_copy_writer_agent,
        visual_suggester_agent,
        formatter_agent,
    ]
)
```

System Flow Diagram


User Input
Marketing Campaign Assistant
Market Research Agent
Research Tools Available?
Yes
No
Google Search Tool
Skip Tool Usage
Market Research Summary
Messaging Strategist Agent
Key Messaging Strategy
Ad Copy Writer Agent



Detailed System Flow

Phase 1: Initialization

1. **User Input** → System receives campaign requirements
2. **Marketing Campaign Assistant** → Orchestrator begins sequential workflow

Phase 2: Market Research

3. **Market Research Agent** → Analyzes market conditions
4. **Tool Integration** → Utilizes Google Search for external data
5. **Research Summary** → Consolidates findings into structured output

Phase 3: Strategy Development

6. **Messaging Strategist** → Develops key messaging based on research
7. **Key Messaging** → Creates strategic messaging framework

Phase 4: Creative Development

8. **Ad Copy Writer** → Generates multiple ad copy variations
9. **Ad Copy Variations** → Produces diverse creative content options

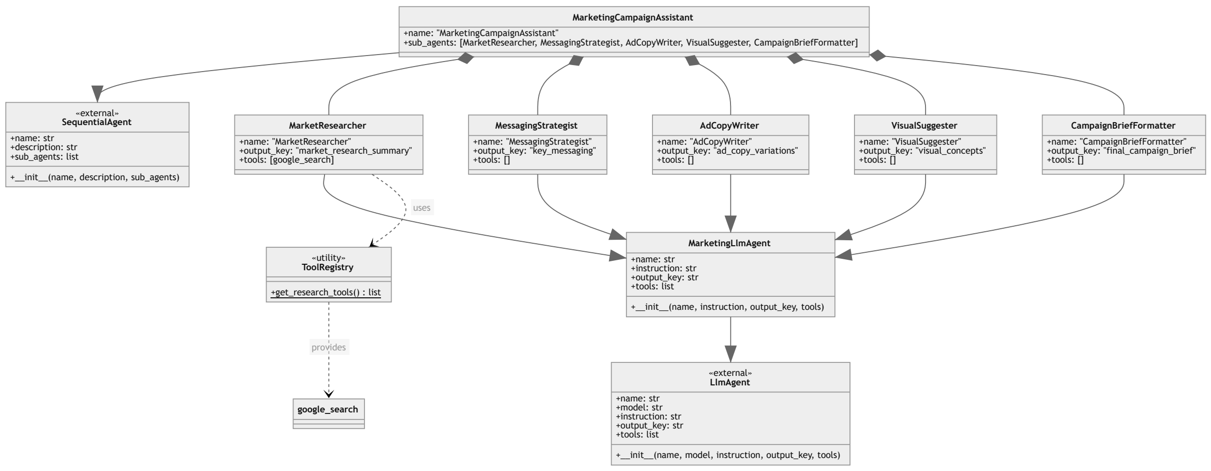
Phase 5: Visual Planning

10. **Visual Suggester** → Recommends visual concepts and themes
11. **Visual Concepts** → Provides creative direction for visuals

Phase 6: Final Assembly

12. **Campaign Brief Formatter** → Assembles all components into final brief
13. **Final Campaign Brief** → Delivers comprehensive campaign package

UML Class Diagram


MarketingCampaignAssistant
+name: "MarketingCampaignAssistant"
+sub_agents: [MarketResearcher, MessagingStrategist, AdCopyWriter, VisualSuggester, CampaignBriefFormatter]
«external»
SequentialAgent
+name: str
+description: str
+sub_agents: list
+__init__(name, description, sub_agents)
MarketResearcher
+name: "MarketResearcher"
+output_key: "market_research_summary"
+tools: [google_search]
MessagingStrategist
+name: "MessagingStrategist"
+output_key: "key_messaging"
+tools: []
AdCopyWriter
+name: "AdCopyWriter"
+output_key: "ad_copy_variations"
+tools: []
VisualSuggester
+name: "VisualSuggester"
+output_key: "visual_concepts"
+tools: []
CampaignBriefFormatter
+name: "CampaignBriefFormatter"
+output_key: "final_campaign_brief"
+tools: []
uses
«utility»
ToolRegistry
+get_research_tools() : list
provides
google_search
MarketingLlmAgent
+name: str
+instruction: str
+output_key: str
+tools: list
+__init__(name, instruction, output_key, tools)
«external»
LlmAgent
+name: str
+model: str
+instruction: str
+output_key: str
+tools: list
+__init__(name, model, instruction, output_key, tools)

Dependencies

External Libraries

- `google.adk.agents` : Provides `LlmAgent` and `SequentialAgent` classes
- `google.adk.tools` : Provides `google_search` tool
- `dotenv` : For environment variable loading (optional)
- `os` : For environment variable access

Internal Dependencies

- `marketing_agents.instructions` : Contains all agent instruction constants. These highly tuned instructions ensure each specialist agent has clear guidance on their specific task

Usage

The system is designed to be used by instantiating the `root_agent` (which is an alias for `campaign_orchestrator`):

```
# The root agent is ready to use
result = root_agent.run(user_input)
```

Design Patterns

1. **Factory Pattern**: `ToolRegistry` acts as a factory for tool collections
2. **Template Method**: `MarketingLlmAgent` provides a template for creating specialized agents
3. **Composite Pattern**: `SequentialAgent` composes multiple sub-agents
4. **Strategy Pattern**: Each agent implements a specific strategy for its domain

Hallucination Mitigation

The system implements several strategies to minimize AI hallucination and ensure factual accuracy:

1. Source Attribution Requirements

- **Market Research Agent**: Explicitly required to cite sources using short URLs or domain names
- **Citation Format**: `[source: statista.com]` format for transparency and verification
- **Authoritative Sources**: Prioritizes recent and authoritative sources through Google Search

2. State-Based Information Flow

- **Controlled Input**: Each agent only uses information from previous agents via state variables

- **No Invention Policy**: Agents explicitly instructed not to invent information
- **Input Validation**: Messaging Strategist instructed: *“Only base your output on the provided input. Do NOT invent information”*

3. Bounded Agent Scope

- **Limited Creativity**: Ad Copy Writer limited to 30 words per variation to prevent elaboration
- **Specific Formats**: Each agent has defined output formats to prevent drift
- **Review Checkpoints**: Formatter Agent required to “double-check that all information is copied accurately”

4. Grounded Research Foundation

- **Tool Integration**: Market Research Agent uses Google Search for real-time data
- **Research-First Approach**: All subsequent agents build on researched facts
- **External Validation**: Search results provide external grounding for all claims

5. Verification Instructions

Key agent instructions that prevent hallucination:

```
Market Researcher: "Clearly cite or mention the source for each insight"
Messaging Strategist: "IMPORTANT: Only base your output on the provided inp
Formatter: "Do not invent or add any new information"
```

6. Sequential Validation

- **Layered Review**: Each agent validates previous agent outputs
- **Fact Preservation**: Information passes through multiple validation layers

7. Low Temperature Parameter

- **Consistency Control**: Temperature set to 0.3 to minimize creative variation
- **Deterministic Outputs**: Low temperature ensures consistent responses to identical prompts

- **Reduced Hallucination**: Lower creativity parameter reduces likelihood of invented information
- **Reproducible Results**: Same inputs produce nearly identical outputs for reliable testing

Error Handling

- Falls back to default model if environment loading fails
- Provides empty tool lists as defaults
- Warns users about missing dependencies