# Data Analysis: Tool Selection for AI Embeddedness

The goal of this analysis is to evaluate the **AI embeddedness** of the tools used across various tasks. AI embeddedness refers to the ability of a tool to handle diverse tasks effectively, demonstrating its versatility and adaptability. The analysis will focus on the **distribution of tools across tasks**, **task complexity**, and **domain diversity**.

# Tool Definitions

**1. Gemini (gemini-1.5-flash)**

**Definition:**

Gemini (gemini-1.5-flash) is a **versatile, multimodal AI tool** designed to handle a wide range of tasks, including text analysis, document processing, video summarization, financial report analysis, and email generation. It is capable of **autonomous decision-making**, **dynamic adaptability**, and **high interactivity**, making it suitable for complex and evolving workflows. Gemini excels in tasks requiring **advanced AI capabilities**, such as natural language understanding, data extraction, and content generation.

**Key Features:**

* **Autonomy:** Can independently perform tasks like contract review, financial analysis, and video summarization with minimal human input.
* **Adaptability:** Dynamically adjusts to changing requirements, such as updating reports or reconfiguring workflows.
* **Interactivity:** Supports two-way communication, enabling tasks like Q&A, CRM updates, and consultation analysis.
* **Functionality:** Handles diverse tasks, including text, audio, video, and document analysis.
* **Reconfigurability:** Easily customized for new tasks, such as modifying templates or adapting to new data formats

**2. Multimodal (resnet-50, m2m100\_418M)**

**Definition:**

Multimodal tools, such as **resnet-50** (for image classification) and **m2m100\_418M** (for document translation), are **specialized AI models** designed to handle tasks involving multiple data types, such as text, images, and audio. These tools are optimized for **specific use cases** like image classification, product categorization, and multilingual document translation. While they are highly effective in their niche areas, they lack the versatility and interactivity of more advanced tools like Gemini.

**Key Features:**

* **Image Classification (resnet-50):** Identifies and categorizes objects in images (e.g., product classification, defect detection).
* **Document Translation (m2m100\_418M):** Translates text between multiple languages while maintaining context and accuracy.
* **Functionality:** Handles tasks involving text and images but is limited to specific use cases.
* **Reconfigurability:** Can be adapted for new tasks but requires significant effort and expertise.

**3. Sentiment\_Analysis (twitter-roberta-base-sentiment)**

**Definition:**

Sentiment\_Analysis (twitter-roberta-base-sentiment) is a **text-based AI tool** specifically designed for **sentiment analysis**. It analyzes text inputs (e.g., customer reviews, social media posts, emails) to determine the sentiment (positive, negative, or neutral) and provides a sentiment score. This tool is highly effective for **low-complexity, repetitive tasks** but lacks the ability to handle multimodal data or complex decision-making.

**Key Features:**

* **Sentiment Analysis:** Classifies text into positive, negative, or neutral categories.
* **Usability:** Easy to use for repetitive tasks like customer feedback analysis.
* **Functionality:** Limited to text-based sentiment analysis.
* **Reconfigurability:** Can be adapted for new sentiment analysis tasks but with limited flexibility.

**Summary of Tool Definitions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tool | Type | Primary Functionality | Strengths | Limitations |
| Gemini (gemini-1.5-flash) | Multimodal, Advanced | Handles text, audio, video, and document analysis with high autonomy and interactivity. | Versatile, adaptable, and capable of complex decision-making. | May require significant computational resources for high-complexity tasks. |
| Multimodal (resnet-50, m2m100\_418M) | Specialized, Multimodal | Handles image classification and document translation. | Effective for specific use cases involving images and text. | Limited versatility and interactivity; struggles with dynamic or complex tasks. |
| Sentiment\_Analysis (twitter-roberta-base-sentiment) | Text-Based, Niche | Performs sentiment analysis on text inputs. | Easy to use and reliable for repetitive sentiment analysis tasks. | Limited to text-based tasks; lacks adaptability and interactivity. |

## 1. Tool Distribution Across Tasks

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| --- | --- | --- |
| Tool | Number of Tasks | Percentage of Total Tasks |
| Gemini (gemini-1.5-flash) | 10 | 47.6% |
| Multimodal (resnet-50, m2m100\_418M) | 6 | 28.6% |
| Sentiment\_Analysis (twitter-roberta-base-sentiment) | 5 | 23.8% |

**Insights:**

* **Gemini (gemini-1.5-flash)** is the most frequently used tool, handling **47.6%** of the tasks. This indicates its high versatility and ability to perform a wide range of tasks, including document analysis, video summarization, email generation, and financial report analysis.
* **Multimodal tools** (resnet-50 and m2m100\_418M) are used in **28.6%** of tasks, primarily for image classification, translation, These tools are specialized for tasks requiring multimodal capabilities (e.g., text + image )
* **Sentiment\_Analysis (twitter-roberta-base-sentiment)** is used in **23.8%** of tasks, focusing exclusively on sentiment analysis across text inputs. While effective for its niche, it is less versatile compared to Gemini and Multimodal tools.

## 2. Task Complexity Analysis

|  |  |  |  |
| --- | --- | --- | --- |
| Tool | Low Complexity Tasks | Medium Complexity Tasks | High Complexity Tasks |
| Gemini (gemini-1.5-flash) | 1 | 3 | 6 |
| Multimodal (resnet-50, m2m100\_418M) | 0 | 4 | 2 |
| Sentiment\_Analysis (twitter-roberta-base-sentiment) | 5 | 0 | 0 |

**Insights:**

* **Gemini (gemini-1.5-flash)** is the most capable tool for handling **high-complexity tasks** (e.g., financial report analysis, contract review, video summarization). It is used in **6 out of 10 high-complexity tasks**, demonstrating its advanced AI capabilities.
* **Multimodal tools** are primarily used for **medium-complexity tasks** (e.g., image classification, document translation) and some high-complexity tasks (e.g., legal document translation). They are less versatile for low-complexity tasks.
* **Sentiment\_Analysis (twitter-roberta-base-sentiment)** is exclusively used for **low-complexity tasks** (e.g., sentiment analysis of text inputs). It lacks the capability to handle more complex tasks.

## 3. Domain Diversity Analysis

|  |  |  |
| --- | --- | --- |
| Tool | Number of Domains | Domains Covered |
| Gemini (gemini-1.5-flash) | 7 | Business, Management, Healthcare, Legal, Financial, Sales, Educational |
| Multimodal (resnet-50, m2m100\_418M) | 5 | E-commerce, Product, Business, Legal, Marketing |
| Sentiment\_Analysis (twitter-roberta-base-sentiment) | 4 | Customer Service, Product, Social Media, HR |

**Insights:**

* **Gemini (gemini-1.5-flash)** covers the **widest range of domains** (7 out of 8 domains), showcasing its ability to adapt to diverse industries and use cases.
* **Multimodal tools** are used in **5 domains**, primarily focusing on tasks involving images, translations. They are less versatile in domains like healthcare and management.
* **Sentiment\_Analysis (twitter-roberta-base-sentiment)** is limited to **4 domains**, primarily those involving text-based sentiment analysis (e.g., customer service, social media).

## 4. Task Type Analysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tool | Text-Based Tasks | Image-Based Tasks | Audio/Video-Based Tasks | PDF Based Tasks |
| Gemini (gemini-1.5-flash) | 3 | 1 | 3 | 3 |
| Multimodal (resnet-50, m2m100\_418M) | 3 | 2 | 0 | 1 |
| Sentiment\_Analysis (twitter-roberta-base-sentiment) | 5 | 0 | 0 | 0 |

**Insights:**

* **Gemini (gemini-1.5-flash)** is highly versatile, handling **text or PDF based tasks** (e.g., email generation, document analysis), **audio/video-based tasks** (e.g., video summarization, consultation analysis), and even some **image-based tasks** (e.g., defect detection).
* **Multimodal tools** are specialized for **image-based tasks** (e.g., product image classification) and **multimodal tasks** (e.g., document translation). They are less effective for audio/video-based tasks.
* **Sentiment\_Analysis (twitter-roberta-base-sentiment)** is limited to **text-based tasks**, making it the least versatile tool.

# AI Embeddedness Scoring

**AI Embeddedness Score** based on the provided parameters, we need to define a scoring methodology for each parameter. Here's how we can approach this:

## 1. Scoring Methodology for Each Parameter

**1. Autonomy**

* **Definition:** Measures the tool's ability to perform tasks independently with minimal human intervention.
* **Scoring Criteria:**
  + **0:** No autonomy (requires significant human input for all tasks).
  + **1:** Low autonomy (handles simple tasks independently but requires human input for complex tasks).
  + **2:** Moderate autonomy (handles most tasks independently but may require occasional human input).
  + **3:** High autonomy (handles all tasks independently, including complex decision-making).

**2. Adaptability**

* **Definition:** Measures the tool's ability to adapt to changing requirements or dynamic data.
* **Scoring Criteria:**
  + **0:** No adaptability (cannot handle changes in requirements or data).
  + **1:** Low adaptability (can handle minor changes but struggles with significant changes).
  + **2:** Moderate adaptability (can handle most changes but may require some reconfiguration).
  + **3:** High adaptability (can handle all changes dynamically without reconfiguration).

**3. Interactivity**

* **Definition:** Measures the tool's ability to facilitate two-way communication or interaction.
* **Scoring Criteria:**
  + **0:** No interactivity (cannot handle interactive tasks).
  + **1:** Low interactivity (handles basic interactive tasks but struggles with complex interactions).
  + **2:** Moderate interactivity (handles most interactive tasks effectively).
  + **3:** High interactivity (excels at all interactive tasks, including complex Q&A and CRM updates).

**4. Usability**

* **Definition:** Measures the tool's ease of use and reliability in repetitive tasks.
* **Scoring Criteria:**
  + **0:** Low usability (requires significant effort to use and is prone to errors).
  + **1:** Moderate usability (usable but requires some effort or training).
  + **2:** High usability (easy to use and reliable for repetitive tasks).
  + **3:** Excellent usability (requires no training and is error-free).

**5. Functionality**

* **Definition:** Measures the tool's ability to perform a wide range of tasks using diverse features.
* **Scoring Criteria:**
  + **0:** Low functionality (limited to a single type of task).
  + **1:** Moderate functionality (handles a few types of tasks).
  + **2:** High functionality (handles many types of tasks).
  + **3:** Excellent functionality (handles all types of tasks with advanced features).

**6. Reconfigurability**

* **Definition:** Measures the tool's ability to be customized or adapted for new tasks.
* **Scoring Criteria:**
  + **0:** No reconfigurability (cannot be customized or adapted).
  + **1:** Low reconfigurability (can be customized with significant effort).
  + **2:** Moderate reconfigurability (can be customized with some effort).
  + **3:** High reconfigurability (can be easily customized or adapted for new tasks).

## 2. Scoring the Tools

Based on the tasks and tool usage in the dataset, here's how each tool scores on the parameters:

**Gemini (gemini-1.5-flash)**

|  |  |  |
| --- | --- | --- |
| Parameter | Score | Reasoning |
| Autonomy | 3 | Handles complex tasks like financial analysis and contract review independently. |
| Adaptability | 3 | Adapts to dynamic data and changing requirements (e.g., video summarization). |
| Interactivity | 3 | Excels at interactive tasks like email generation and consultation analysis. |
| Usability | 3 | Easy to use and reliable for repetitive tasks like report generation. |
| Functionality | 3 | Handles a wide range of tasks, including text, audio, and video analysis. |
| Reconfigurability | 3 | Easily customized for new tasks (e.g., modifying templates for email generation). |
| Total Score | **18** |  |

**Multimodal (resnet-50, m2m100\_418M)**

|  |  |  |
| --- | --- | --- |
| Parameter | Score | Reasoning |
| Autonomy | 2 | Handles tasks like image classification independently but may require input for complex translations. |
| Adaptability | 2 | Adapts to some changes (e.g., different image types) but struggles with dynamic data. |
| Interactivity | 1 | Limited interactivity; primarily used for one-way tasks like image classification. |
| Usability | 2 | Reliable for repetitive tasks but may require some training for new users. |
| Functionality | 2 | Handles multiple tasks but is limited to image and text-based tasks. |
| Reconfigurability | 2 | Can be customized for new tasks but requires significant effort. |
| Total Score | **11** |  |

**Sentiment\_Analysis (twitter-roberta-base-sentiment)**

|  |  |  |
| --- | --- | --- |
| Parameter | Score | Reasoning |
| Autonomy | 1 | Handles simple sentiment analysis independently but cannot handle complex tasks. |
| Adaptability | 1 | Limited adaptability; struggles with changes in sentiment analysis requirements. |
| Interactivity | 0 | No interactivity; only performs one-way sentiment analysis. |
| Usability | 2 | Easy to use for repetitive sentiment analysis tasks. |
| Functionality | 1 | Limited to text-based sentiment analysis. |
| Reconfigurability | 1 | Can be customized for new sentiment analysis tasks but with significant effort. |
| Total Score | **6** |  |

## 3. AI Embeddedness Scores

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Tool | Autonomy | Adaptability | Interactivity | Usability | Functionality | Reconfigurability | Total Score |
| Gemini (gemini-1.5-flash) | 3 | 3 | 3 | 3 | 3 | 3 | **18** |
| Multimodal (resnet-50, m2m100\_418M) | 2 | 2 | 1 | 2 | 2 | 2 | **11** |
| Sentiment\_Analysis (twitter-roberta-base-sentiment) | 1 | 1 | 0 | 2 | 1 | 1 | **6** |

## 4. Interpretation of Scores

* **Gemini (gemini-1.5-flash):** Scores **18/18**, indicating **excellent AI embeddedness**. It excels in autonomy, adaptability, interactivity, usability, functionality, and reconfigurability, making it the most versatile and capable tool.
* **Multimodal Tools:** Scores **11/18**, indicating **moderate AI embeddedness**. It performs well in autonomy and adaptability but lacks interactivity and advanced functionality.
* **Sentiment\_Analysis:** Scores **6/18**, indicating **low AI embeddedness**. It is limited to simple, repetitive tasks and lacks interactivity and adaptability.