

# Package ‘asa’

December 26, 2025

**Title** AI Search Agent for Large-Scale Research Automation

**Version** 0.1.0

**Description** Provides an LLM-powered research agent for performing AI search tasks at large scales. Uses a ReAct (Reasoning + Acting) agent pattern with web search capabilities via DuckDuckGo and Wikipedia. Implements DeepAgent-style memory folding for context management. The agent is built on 'LangGraph' and supports multiple LLM backends including 'OpenAI', 'Groq', and 'xAI'.

**URL** <https://github.com/cjerzak/asa-software>

**BugReports** <https://github.com/cjerzak/asa-software/issues>

**Depends** R (>= 4.0.0)

**License** GPL-3

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**VignetteBuilder** knitr

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**SystemRequirements** Python (>= 3.11), Conda, Tor (optional, for anonymous searching)

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**Index****30****as.data.frame.asa\_enumerate\_result***Convert asa\_enumerate\_result to Data Frame***Description**

Convert asa\_enumerate\_result to Data Frame

**Usage**

```
## S3 method for class 'asa_enumerate_result'
as.data.frame(x, ...)
```

**Arguments**

- x An asa\_enumerate\_result object
- ... Additional arguments (ignored)

**Value**

The data data.frame from the result

---

```
as.data.frame.asa_result
```

*Convert asa\_result to Data Frame*

---

**Description**

Convert asa\_result to Data Frame

**Usage**

```
## S3 method for class 'asa_result'  
as.data.frame(x, ...)
```

**Arguments**

x	An asa_result object
...	Additional arguments (ignored)

**Value**

A single-row data frame

---

```
asa_agent
```

*Constructor for asa\_agent Objects*

---

**Description**

Creates an S3 object representing an initialized ASA search agent.

**Usage**

```
asa_agent(python_agent, backend, model, config)
```

**Arguments**

python_agent	The underlying Python agent object
backend	LLM backend name (e.g., "openai", "groq")
model	Model identifier
config	Agent configuration list

**Value**

An object of class asa\_agent

asa\_enumerate

*Multi-Agent Research for Open-Ended Queries*

## Description

Performs intelligent open-ended research tasks using multi-agent orchestration. Decomposes complex queries into sub-tasks, executes parallel searches, and aggregates results into structured output (data.frame, CSV, or JSON).

## Usage

```
asa_enumerate(
  query,
  schema = NULL,
  output = c("data.frame", "csv", "json"),
  max_workers = 4L,
  max_rounds = 8L,
  budget = list(queries = 50L, tokens = 200000L, time_sec = 300L),
  stop_policy = list(target_items = NULL, plateau_rounds = 2L, novelty_min = 0.05,
    novelty_window = 20L),
  sources = list(web = TRUE, wikipedia = TRUE, wikidata = TRUE),
  pagination = TRUE,
  progress = TRUE,
  include_provenance = FALSE,
  checkpoint = TRUE,
  checkpoint_dir = tempdir(),
  resume_from = NULL,
  agent = NULL,
  backend = "openai",
  model = "gpt-4.1-mini",
  conda_env = "asa_env",
  verbose = TRUE
)
```

## Arguments

query	Character string describing the research goal. Examples: "Find all current US senators with their state, party, and term end date"
schema	Named character vector defining the output schema. Names are column names, values are R types ("character", "numeric", "logical"). Use NULL or "auto" for LLM-proposed schema.
output	Output format: "data.frame" (default), "csv", or "json".
max_workers	Maximum number of parallel search workers (default: 4).
max_rounds	Maximum research iterations (default: 8).
budget	Named list with resource limits: <ul style="list-style-type: none"> <li>• queries: Maximum search queries (default: 50)</li> <li>• tokens: Maximum LLM tokens (default: 200000)</li> <li>• time_sec: Maximum execution time in seconds (default: 300)</li> </ul>
stop_policy	Named list with stopping criteria:

	<ul style="list-style-type: none"> <li>• target_items: Stop when this many items found (NULL = unknown)</li> <li>• plateau_rounds: Stop after N rounds with no new items (default: 2)</li> <li>• novelty_min: Minimum new items ratio per round (default: 0.05)</li> <li>• novelty_window: Window size for novelty calculation (default: 20)</li> </ul>
sources	Named list controlling which sources to use: <ul style="list-style-type: none"> <li>• web: Use DuckDuckGo web search (default: TRUE)</li> <li>• wikipedia: Use Wikipedia (default: TRUE)</li> <li>• wikidata: Use Wikidata SPARQL for authoritative enumerations (default: TRUE)</li> </ul>
pagination	Enable pagination for large result sets (default: TRUE).
progress	Show progress bar and status updates (default: TRUE).
include_provenance	Include source URLs and confidence per row (default: FALSE).
checkpoint	Enable auto-save after each round (default: TRUE).
checkpoint_dir	Directory for checkpoint files (default: tempdir()).
resume_from	Path to checkpoint file to resume from (default: NULL).
agent	An initialized asa_agent object. If NULL, uses the current agent or creates a new one with specified backend/model.
backend	LLM backend if creating new agent: "openai", "groq", "xai", "openrouter".
model	Model identifier if creating new agent.
conda_env	Conda environment name (default: "asa_env").
verbose	Print status messages (default: TRUE).

## Details

The function uses a multi-agent architecture:

1. **Planner:** Decomposes query into facets and identifies authoritative sources
2. **Dispatcher:** Spawns parallel workers for each facet
3. **Workers:** Execute searches using DDG, Wikipedia, and Wikidata
4. **Extractor:** Normalizes results to match schema
5. **Deduper:** Removes duplicates using hash + fuzzy matching
6. **Stopper:** Evaluates stopping criteria (novelty, budget, saturation)

For known entity types (US senators, countries, Fortune 500), Wikidata provides authoritative enumerations with complete, verified data.

## Value

An object of class asa\_enumerate\_result containing:

- data: data.frame with results matching the schema
- status: "complete", "partial", or "failed"
- stop\_reason: Why the search stopped
- metrics: List with rounds, queries\_used, novelty\_curve, coverage
- provenance: If include\_provenance=TRUE, source info per row
- checkpoint\_file: Path to checkpoint if saved

## Checkpointing

With checkpoint=TRUE, state is saved after each round. If interrupted, use resume\_from to continue from the last checkpoint:

```
result <- asa_enumerate(query, resume_from = "/path/to/checkpoint.rds")
```

## Schema

The schema defines expected output columns:

```
schema = c(name = "character", state = "character", party = "character")
```

With schema = "auto", the planner agent proposes a schema based on the query.

## See Also

[run\\_task](#), [initialize\\_agent](#)

## Examples

```
## Not run:
# Find all US senators
senators <- asa_enumerate(
  query = "Find all current US senators with state, party, and term end date",
  schema = c(name = "character", state = "character",
             party = "character", term_end = "character"),
  stop_policy = list(target_items = 100),
  include_provenance = TRUE
)
head(senators$data)

# Find countries with auto schema
countries <- asa_enumerate(
  query = "Find all countries with their capitals and populations",
  schema = "auto",
  output = "csv"
)

# Resume from checkpoint
result <- asa_enumerate(
  query = "Find Fortune 500 CEOs",
  resume_from = "/tmp/asa_enumerate_abc123.rds"
)
## End(Not run)
```

**asa\_enumerate\_result**    *Constructor for asa\_enumerate\_result Objects*

## Description

Creates an S3 object representing the result of an enumeration task.

**Usage**

```
asa_enumerate_result(
  data,
  status,
  stop_reason,
  metrics,
  provenance = NULL,
  plan = NULL,
  checkpoint_file = NULL,
  query = NULL,
  schema = NULL
)
```

**Arguments**

data	data.frame containing the enumeration results
status	Result status: "complete", "partial", or "failed"
stop_reason	Why the enumeration stopped (e.g., "target_reached", "novelty_plateau")
metrics	List with execution metrics (rounds, queries_used, etc.)
provenance	Optional data.frame with source information per row
plan	The enumeration plan from the planner agent
checkpoint_file	Path to saved checkpoint file
query	The original enumeration query
schema	The schema used for extraction

**Value**

An object of class `asa_enumerate_result`

---

`asa_response`

*Constructor for `asa_response` Objects*

---

**Description**

Creates an S3 object representing an agent response.

**Usage**

```
asa_response(
  message,
  status_code,
  raw_response,
  trace,
  elapsed_time,
  fold_count,
  prompt
)
```

**Arguments**

<code>message</code>	The final response text
<code>status_code</code>	Status code (200 = success, 100 = error)
<code>raw_response</code>	The full Python response object
<code>trace</code>	Full text trace of agent execution
<code>elapsed_time</code>	Execution time in minutes
<code>fold_count</code>	Number of memory folds performed
<code>prompt</code>	The original prompt

**Value**

An object of class `asa_response`

**asa\_result**

*Constructor for asa\_result Objects*

**Description**

Creates an S3 object representing the result of a research task.

**Usage**

```
asa_result(prompt, message, parsed, raw_output, elapsed_time, status)
```

**Arguments**

<code>prompt</code>	The original prompt
<code>message</code>	The agent's response text
<code>parsed</code>	Parsed output (list or NULL)
<code>raw_output</code>	Full agent trace
<code>elapsed_time</code>	Execution time in minutes
<code>status</code>	Status ("success" or "error")

**Value**

An object of class `asa_result`

---

build_backend	<i>Build the Python Backend Environment</i>
---------------	---

---

## Description

Creates a conda environment with all required Python dependencies for the asa search agent, including LangChain, LangGraph, and search tools.

## Usage

```
build_backend(conda_env = "asa_env", conda = "auto", python_version = "3.13")
```

## Arguments

conda_env	Name of the conda environment (default: "asa_env")
conda	Path to conda executable (default: "auto")
python_version	Python version to use (default: "3.13")

## Details

This function creates a new conda environment and installs the following Python packages:

- langchain\_groq, langchain\_community, langchain\_openai
- langgraph
- ddgs (DuckDuckGo search)
- selenium, primp (browser automation)
- beautifulsoup4, requests
- fake\_headers, httpx
- pysocks, socksio (proxy support)

## Value

Invisibly returns NULL; called for side effects.

## Examples

```
## Not run:  
# Create the default environment  
build_backend()  
  
# Create with a custom name  
build_backend(conda_env = "my_asa_env")  
  
## End(Not run)
```

<code>build_prompt</code>	<i>Build a Task Prompt from Template</i>
---------------------------	--

### Description

Creates a formatted prompt by substituting variables into a template.

### Usage

```
build_prompt(template, ...)
```

### Arguments

<code>template</code>	A character string with placeholders in the form <code>{variable_name}</code>
<code>...</code>	Named arguments to substitute into the template

### Value

A formatted prompt string

### Examples

```
## Not run:
prompt <- build_prompt(
  template = "Find information about {{name}} in {{country}} during {{year}}",
  name = "Marie Curie",
  country = "France",
  year = 1903
)
## End(Not run)
```

<code>check_backend</code>	<i>Check Python Environment Availability</i>
----------------------------	--

### Description

Checks if the required Python environment and packages are available.

### Usage

```
check_backend(conda_env = "asa_env")
```

### Arguments

<code>conda_env</code>	Name of the conda environment to check
------------------------	--

**Value**

A list with components:

- available: Logical, TRUE if environment is ready
- conda\_env: Name of the environment checked
- python\_version: Python version if available
- missing\_packages: Character vector of missing packages (if any)

**Examples**

```
## Not run:
status <- check_backend()
if (!status$available) {
  build_backend()
}

## End(Not run)
```

configure\_search

*Configure Python Search Parameters***Description**

Sets global configuration values for the Python search module. These values control timeouts, retry behavior, and result limits.

**Usage**

```
configure_search(
  max_results = NULL,
  timeout = NULL,
  max_retries = NULL,
  retry_delay = NULL,
  backoff_multiplier = NULL,
  captcha_backoff_base = NULL,
  page_load_wait = NULL,
  inter_search_delay = NULL,
  conda_env = "asa_env"
)
```

**Arguments**

max_results	Maximum number of search results to return (default: 10)
timeout	HTTP request timeout in seconds (default: 15)
max_retries	Maximum retry attempts on failure (default: 3)
retry_delay	Initial delay between retries in seconds (default: 2)
backoff_multiplier	Multiplier for exponential backoff (default: 1.5)

```

captcha_backoff_base
    Base multiplier for CAPTCHA backoff (default: 3)
page_load_wait  Wait time after page load in seconds (default: 2)
inter_search_delay
    Delay between consecutive searches in seconds (default: 0.5)
conda_env      Name of the conda environment (default: "asa_env")

```

**Value**

Invisibly returns a list with the current configuration

**Examples**

```

## Not run:
# Increase timeout for slow connections
configure_search(timeout = 30, max_retries = 5)

# Get more results
configure_search(max_results = 20)

# Add delay between searches to avoid rate limiting
configure_search(inter_search_delay = 2.0)

## End(Not run)

```

**configure\_search\_logging**

*Configure Python Search Logging Level*

**Description**

Sets the logging level for the Python search module. This controls how much diagnostic output is produced during web searches.

**Usage**

```
configure_search_logging(level = "WARNING", conda_env = "asa_env")
```

**Arguments**

level	Log level: "DEBUG", "INFO", "WARNING" (default), "ERROR", or "CRITICAL"
conda_env	Name of the conda environment (default: "asa_env")

**Details**

Log levels from most to least verbose:

- DEBUG: Detailed diagnostic information for debugging
- INFO: General operational information
- WARNING: Indicates something unexpected but not an error (default)
- ERROR: Serious problems that prevented an operation
- CRITICAL: Very serious errors

**Value**

Invisibly returns the current logging level

**Examples**

```
## Not run:
# Enable verbose debugging output
configure_search_logging("DEBUG")

# Run a search (will show detailed logs)
result <- run_task("What is the population of Tokyo?", agent = agent)

# Disable verbose output
configure_search_logging("WARNING")

## End(Not run)
```

`extract_agent_results` *Extract Structured Data from Agent Traces*

**Description**

Parses raw agent output to extract search snippets, Wikipedia content, URLs, JSON data, and search tier information. This is the main function for post-processing agent traces.

**Usage**

```
extract_agent_results(raw_output)
```

**Arguments**

<code>raw_output</code>	Raw output string from agent invocation (the trace field from an <code>asa_response</code> object)
-------------------------	--

**Value**

A list with components:

- `search_snippets`: Character vector of search result content
- `search_urls`: Character vector of URLs from search results
- `wikipedia_snippets`: Character vector of Wikipedia content
- `json_data`: Extracted JSON data as a list (if present)
- `search_tiers`: Character vector of unique search tiers used (e.g., "primp", "selenium", "ddgs", "requests")

## Examples

```
## Not run:
response <- run_agent("Who is the president of France?", agent)
extracted <- extract_agent_results(response$trace)
print(extracted$search_snippets)
print(extracted$search_tiers) # Shows which search tier was used

## End(Not run)
```

### extract\_search\_snippets

*Extract Search Snippets by Source Number*

## Description

Extracts content from Search tool messages in the agent trace.

## Usage

```
extract_search_snippets(text)
```

## Arguments

text	Raw agent trace text
------	----------------------

## Value

Character vector of search snippets, ordered by source number

## Examples

```
## Not run:
snippets <- extract_search_snippets(response$trace)

## End(Not run)
```

### extract\_search\_tiers    *Extract Search Tier Information*

## Description

Extracts which search tier was used from the agent trace. The search module uses a multi-tier fallback system:

- primp: Fast HTTP client with browser impersonation (Tier 0)
- selenium: Headless browser for JS-rendered content (Tier 1)
- ddgs: Standard DDGS Python library (Tier 2)
- requests: Raw POST to DuckDuckGo HTML endpoint (Tier 3)

**Usage**

```
extract_search_tiers(text)
```

**Arguments**

text            Raw agent trace text

**Value**

Character vector of unique tier names encountered (e.g., "primp", "selenium", "ddgs", "requests")

**Examples**

```
## Not run:  
tiers <- extract_search_tiers(response$trace)  
print(tiers) # e.g., "primp"  
  
## End(Not run)
```

---

**extract\_urls**

*Extract URLs by Source Number*

---

**Description**

Extracts URLs from Search tool messages in the agent trace.

**Usage**

```
extract_urls(text)
```

**Arguments**

text            Raw agent trace text

**Value**

Character vector of URLs, ordered by source number

**Examples**

```
## Not run:  
urls <- extract_urls(response$trace)  
  
## End(Not run)
```

---

`extract_wikipedia_content`  
*Extract Wikipedia Content*

---

**Description**

Extracts content from Wikipedia tool messages in the agent trace.

**Usage**

```
extract_wikipedia_content(text)
```

**Arguments**

<code>text</code>	Raw agent trace text
-------------------	----------------------

**Value**

Character vector of Wikipedia snippets

**Examples**

```
## Not run:  

wiki <- extract_wikipedia_content(response$trace)  
  

## End(Not run)
```

---

`get_agent` *Get the Current Agent*

---

**Description**

Returns the currently initialized agent, or NULL if not initialized.

**Usage**

```
get_agent()
```

**Value**

An asa\_agent object or NULL

**Examples**

```
## Not run:  

agent <- get_agent()  

if (is.null(agent)) {  

  agent <- initialize_agent()  

}  
  

## End(Not run)
```

<code>get_tor_ip</code>	<i>Get External IP via Tor</i>
-------------------------	--------------------------------

### Description

Retrieves the external IP address as seen through Tor proxy.

### Usage

```
get_tor_ip(proxy = "socks5h://127.0.0.1:9050")
```

### Arguments

<code>proxy</code>	Tor proxy URL
--------------------	---------------

### Value

IP address string or NA on failure

### Examples

```
## Not run:
ip <- get_tor_ip()
message("Current Tor IP: ", ip)

## End(Not run)
```

<code>initialize_agent</code>	<i>Initialize the ASA Search Agent</i>
-------------------------------	--

### Description

Initializes the Python environment and creates the LangGraph agent with search tools (Wikipedia, DuckDuckGo). The agent can use multiple LLM backends and supports DeepAgent-style memory folding.

### Usage

```
initialize_agent(
  backend = "openai",
  model = "gpt-4.1-mini",
  conda_env = "asa_env",
  proxy = "socks5h://127.0.0.1:9050",
  use_memory_folding = TRUE,
  memory_threshold = 4L,
  memory_keep_recent = 2L,
  rate_limit = 0.2,
  timeout = 120L,
  verbose = TRUE
)
```

### Arguments

backend	LLM backend to use. One of: "openai", "groq", "xai", "exo", "openrouter"
model	Model identifier (e.g., "gpt-4.1-mini", "llama-3.3-70b-versatile")
conda_env	Name of the conda environment with Python dependencies
proxy	SOCKS5 proxy URL for Tor (default: "socks5h://127.0.0.1:9050"). Set to NULL to disable proxy.
use_memory_folding	Enable DeepAgent-style memory compression (default: TRUE)
memory_threshold	Number of messages before folding triggers (default: 4)
memory_keep_recent	Number of recent messages to preserve after folding (default: 2)
rate_limit	Requests per second for rate limiting (default: 0.2)
timeout	Request timeout in seconds (default: 120)
verbose	Print status messages (default: TRUE)

### Details

The agent is created with two tools:

- Wikipedia: For looking up encyclopedic information
- DuckDuckGo Search: For web searches with a 4-tier fallback system (PRIMP -> Selenium -> DDGS library -> raw requests)

Memory folding (enabled by default) compresses older messages into a summary to manage context length in long conversations, following the DeepAgent paper.

### Value

An object of class `asa_agent` containing the initialized agent and configuration.

### API Keys

The following environment variables should be set based on your backend:

- OpenAI: OPENAI\_API\_KEY
- Groq: GROQ\_API\_KEY
- xAI: XAI\_API\_KEY
- OpenRouter: OPENROUTER\_API\_KEY

### OpenRouter Models

When using the "openrouter" backend, model names must be in provider/model-name format.  
Examples:

- "openai/gpt-4o"
- "anthropic/cllaude-3-sonnet"
- "google/gemma-2-9b-it:free"
- "meta-llama/llama-3-70b-instruct"

See <https://openrouter.ai/models> for available models.

**See Also**

[run\\_agent](#), [run\\_task](#)

**Examples**

```
## Not run:
# Initialize with OpenAI
agent <- initialize_agent(
  backend = "openai",
  model = "gpt-4.1-mini"
)

# Initialize with Groq and custom settings
agent <- initialize_agent(
  backend = "groq",
  model = "llama-3.3-70b-versatile",
  use_memory_folding = FALSE,
  proxy = NULL # No Tor proxy
)

# Initialize with OpenRouter (access to 100+ models)
agent <- initialize_agent(
  backend = "openrouter",
  model = "anthropic/clause-3-sonnet" # Note: provider/model format
)

## End(Not run)
```

is_tor_running	<i>Check if Tor is Running</i>
----------------	--------------------------------

**Description**

Checks if Tor is running and accessible on the default port.

**Usage**

```
is_tor_running(port = 9050L)
```

**Arguments**

port	Port number (default: 9050)
------	-----------------------------

**Value**

Logical indicating if Tor appears to be running

## Examples

```
## Not run:
if (!is_tor_running()) {
  message("Start Tor with: brew services start tor")
}

## End(Not run)
```

**print.asa\_agent**

*Print Method for asa\_agent Objects*

## Description

Print Method for asa\_agent Objects

## Usage

```
## S3 method for class 'asa_agent'
print(x, ...)
```

## Arguments

x	An asa_agent object
...	Additional arguments (ignored)

## Value

Invisibly returns the object

**print.asa\_enumerate\_result**

*Print Method for asa\_enumerate\_result Objects*

## Description

Print Method for asa\_enumerate\_result Objects

## Usage

```
## S3 method for class 'asa_enumerate_result'
print(x, n = 6, ...)
```

## Arguments

x	An asa_enumerate_result object
n	Number of data rows to preview (default: 6)
...	Additional arguments (ignored)

## Value

Invisibly returns the object

---

print.asa\_response      *Print Method for asa\_response Objects*

---

## Description

Print Method for asa\_response Objects

## Usage

```
## S3 method for class 'asa_response'  
print(x, ...)
```

## Arguments

x	An asa_response object
...	Additional arguments (ignored)

## Value

Invisibly returns the object

---

print.asa\_result      *Print Method for asa\_result Objects*

---

## Description

Print Method for asa\_result Objects

## Usage

```
## S3 method for class 'asa_result'  
print(x, ...)
```

## Arguments

x	An asa_result object
...	Additional arguments (ignored)

## Value

Invisibly returns the object

---

process\_outputs      *Process Multiple Agent Outputs*

---

### Description

Processes a data frame of raw agent outputs, extracting structured data.

### Usage

```
process_outputs(df, parallel = FALSE, workers = 10L)
```

### Arguments

df	Data frame with a 'raw_output' column containing agent traces
parallel	Use parallel processing
workers	Number of workers

### Value

The input data frame with additional extracted columns: search\_count, wiki\_count, and any JSON fields found

---

reset\_agent      *Reset the Agent*

---

### Description

Clears the initialized agent state, forcing reinitialization on next use. Also closes any open HTTP clients to prevent resource leaks.

### Usage

```
reset_agent()
```

### Value

Invisibly returns NULL

---

rotate_tor_circuit	<i>Rotate Tor Circuit</i>
--------------------	---------------------------

---

### Description

Requests a new Tor circuit by restarting the Tor service.

### Usage

```
rotate_tor_circuit(method = c("brew", "systemctl", "signal"), wait = 12L)
```

### Arguments

method	Method to restart: "brew" (macOS), "systemctl" (Linux), or "signal"
wait	Seconds to wait for new circuit (default: 12)

### Value

Invisibly returns NULL

### Examples

```
## Not run:  
rotate_tor_circuit()  
  
## End(Not run)
```

---

run_agent	<i>Run the ASA Agent with a Custom Prompt</i>
-----------	---

---

### Description

Invokes the search agent with an arbitrary prompt, returning the full agent trace and response. This is the low-level function for running the agent; for structured task execution, use [run\\_task](#).

### Usage

```
run_agent(prompt, agent = NULL, recursion_limit = NULL, verbose = FALSE)
```

### Arguments

prompt	The prompt to send to the agent
agent	An <code>asa_agent</code> object from <a href="#">initialize_agent</a> , or NULL to use/create the default agent
recursion_limit	Maximum number of agent steps (default: 100 for memory folding, 20 otherwise)
verbose	Print status messages (default: FALSE)

**Value**

An object of class `asa_response` containing:

- `message`: The final response text
- `status_code`: 200 for success, 100 for error
- `raw_response`: The full Python response object
- `trace`: Full text trace of agent execution
- `elapsed_time`: Execution time in minutes
- `fold_count`: Number of memory folds (if memory folding enabled)

**See Also**

[initialize\\_agent](#), [run\\_task](#)

**Examples**

```
## Not run:
# Run with a custom prompt
agent <- initialize_agent()
result <- run_agent(
  prompt = "Who was the 44th president of the United States?",
  agent = agent
)
print(result$message)

## End(Not run)
```

**run\_agent\_batch**

*Run Agent in Batch Mode*

**Description**

Runs the agent on multiple prompts, optionally in parallel.

**Usage**

```
run_agent_batch(
  prompts,
  agent = NULL,
  parallel = FALSE,
  workers = 4L,
  progress = TRUE
)
```

**Arguments**

<code>prompts</code>	Character vector of prompts
<code>agent</code>	An <code>asa_agent</code> object
<code>parallel</code>	Use parallel processing (requires <code>future.apply</code> package)
<code>workers</code>	Number of parallel workers (default: 4)
<code>progress</code>	Show progress bar (default: TRUE)

**Value**

A list of asa\_response objects

**Examples**

```
## Not run:
prompts <- c(
  "What is the population of Tokyo?",
  "What is the population of New York?"
)
results <- run_agent_batch(prompts, agent)

## End(Not run)
```

run\_task

*Run a Structured Task with the Agent***Description**

Executes a research task using the AI search agent with a structured prompt and returns parsed results.

**Usage**

```
run_task(prompt, output_format = "text", agent = NULL, verbose = FALSE)
```

**Arguments**

<code>prompt</code>	The task prompt or question for the agent to research
<code>output_format</code>	Expected output format. One of: "text" (raw response), "json" (parse as JSON), or a character vector of field names to extract
<code>agent</code>	An asa_agent object from <a href="#">initialize_agent</a> , or NULL to use the currently initialized agent
<code>verbose</code>	Print progress messages (default: FALSE)

**Details**

This function provides a high-level interface for running research tasks. For simple text responses, use `output_format = "text"`. For structured outputs, use `output_format = "json"` or specify field names to extract.

**Value**

An object of class asa\_result with components:

- `prompt`: The original prompt
- `message`: The agent's response text
- `parsed`: Parsed output (if `output_format` specified)
- `raw_output`: Full agent trace
- `elapsed_time`: Execution time in minutes
- `status`: "success" or "error"

**See Also**

[initialize\\_agent](#), [run\\_agent](#), [run\\_task\\_batch](#)

**Examples**

```
## Not run:
# Initialize agent first
agent <- initialize_agent(backend = "openai", model = "gpt-4.1-mini")

# Simple text query
result <- run_task(
  prompt = "What is the capital of France?",
  output_format = "text",
  agent = agent
)
print(result$message)

# JSON structured output
result <- run_task(
  prompt = "Find information about Albert Einstein and return JSON with
            fields: birth_year, death_year, nationality, field_of_study",
  output_format = "json",
  agent = agent
)
print(result$parsed)

## End(Not run)
```

**run\_task\_batch**

*Run Multiple Tasks in Batch*

**Description**

Executes multiple research tasks, optionally in parallel.

**Usage**

```
run_task_batch(
  prompts,
  output_format = "text",
  agent = NULL,
  parallel = FALSE,
  workers = 4L,
  progress = TRUE
)
```

**Arguments**

- |                            |  |
|----------------------------|--|
| <code>prompts</code>       | Character vector of task prompts, or a data frame with a 'prompt' column |
| <code>output_format</code> | Expected output format (applies to all tasks)                            |
| <code>agent</code>         | An asa_agent object  |

parallel	Use parallel processing
workers	Number of parallel workers
progress	Show progress messages

**Value**

A list of asa\_result objects, or if prompts was a data frame, the data frame with result columns added

**Examples**

```
## Not run:
prompts <- c(
  "What is the population of Tokyo?",
  "What is the population of New York?",
  "What is the population of London?"
)
results <- run_task_batch(prompts, agent = agent)

## End(Not run)
```

summary.asa\_agent      *Summary Method for asa\_agent Objects*

**Description**

Summary Method for asa\_agent Objects

**Usage**

```
## S3 method for class 'asa_agent'
summary(object, ...)
```

**Arguments**

object	An asa_agent object
...	Additional arguments (ignored)

**Value**

Invisibly returns a summary list

---

**summary.asa\_enumerate\_result**

*Summary Method for asa\_enumerate\_result Objects*

---

**Description**

Summary Method for asa\_enumerate\_result Objects

**Usage**

```
## S3 method for class 'asa_enumerate_result'  
summary(object, ...)
```

**Arguments**

object	An asa_enumerate_result object
...	Additional arguments (ignored)

**Value**

Invisibly returns a summary list

---

**summary.asa\_response**    *Summary Method for asa\_response Objects*

---

**Description**

Summary Method for asa\_response Objects

**Usage**

```
## S3 method for class 'asa_response'  
summary(object, show_trace = FALSE, ...)
```

**Arguments**

object	An asa_response object
show_trace	Include full trace in output
...	Additional arguments (ignored)

**Value**

Invisibly returns a summary list

---

```
summary.asa_result      Summary Method for asa_result Objects
```

---

### Description

Summary Method for asa\_result Objects

### Usage

```
## S3 method for class 'asa_result'  
summary(object, ...)
```

### Arguments

object	An asa_result object
...	Additional arguments (ignored)

### Value

Invisibly returns a summary list

---

```
write_csv.asa_enumerate_result  
Write asa_enumerate_result to CSV
```

---

### Description

Write asa\_enumerate\_result to CSV

### Usage

```
write_csv.asa_enumerate_result(x, file, include_provenance = FALSE, ...)
```

### Arguments

x	An asa_enumerate_result object
file	Path to output CSV file
include_provenance	Include provenance as additional columns
...	Additional arguments passed to write.csv

### Value

Invisibly returns the file path

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