pygma

Personalization of multi-agent systems

Automation of Social Media Blogging

Andre Kuzminykh
Chief Technology Officer

About the Author

Andre Kuzminykh

- **Accenture** Ex-Data Engineer
- **Сбер** Ex-Chief Data Officer | Chief Data Scientist
- **Docet Venture Studio** Ex-Chief Technology Officer
- **Pygma AI** Chief Technology Officer
- **Andre AI Technologies** Founder | CTO-as-a-Service

Contents

1. About the Task of Automatic Blogging on Social Media
2. Defining an LLM-based Agent
3. Autonomous Agents and Levels of Autonomy
4. Tools for Developing Multi-Agent Systems
5. Methods for Personalizing Agents
6. Architecture of a Multi-Agent System for Blogging on Social Media

Product Task

PYGMA (Personalize Your Generative Multimodal Agent) - Putting the user's blog on autopilot

The intelligent social media agent should be able to:

- Create a digital twin of the user (text style, photos, voice & talking heads)
- Automatically generate engaging content (lifestyle, thematic & news-related)
- Automatically respond to messages and comments on behalf of the user

LLM-based Agents

Types of Agents:

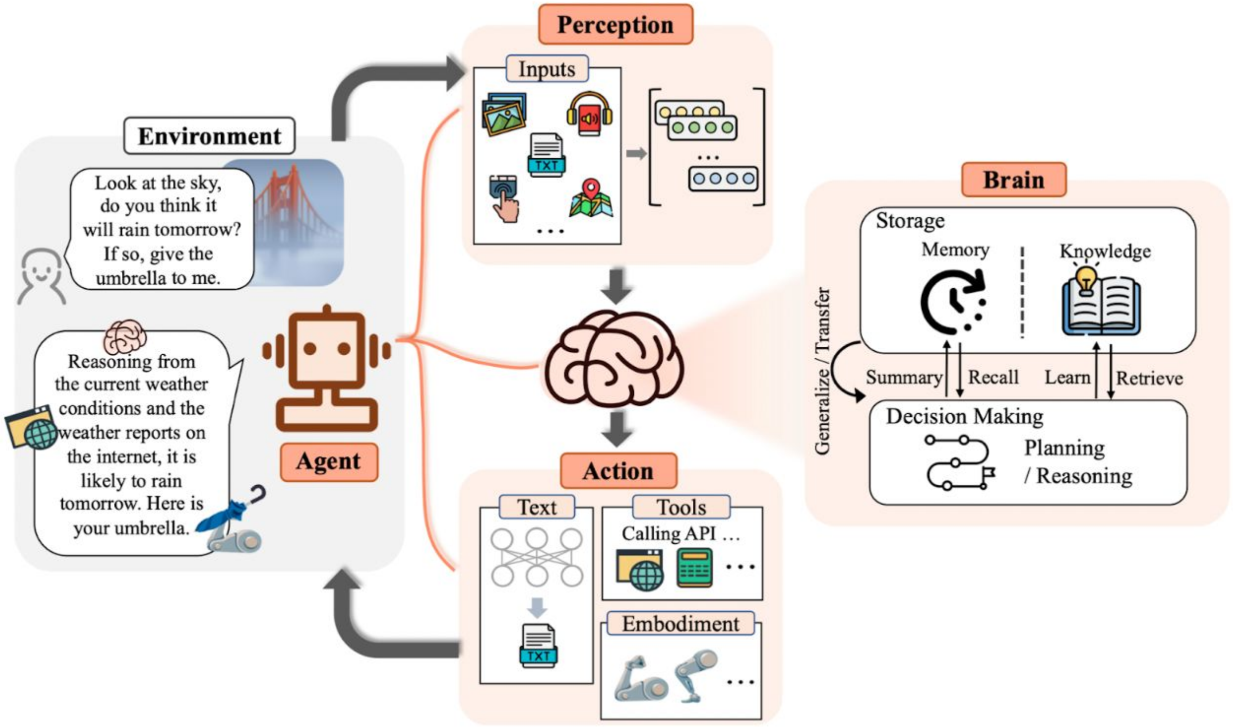
- Symbolic Agents
- Reactive Agents
- Agents with Reinforcement Learning
- Agents with Transfer Learning and Meta-Learning
- Agents Based on Large Language Models (LLM)

Properties of Agents:

- Autonomy
- Reactivity
- Proactivity
- Personalization
- Socialization

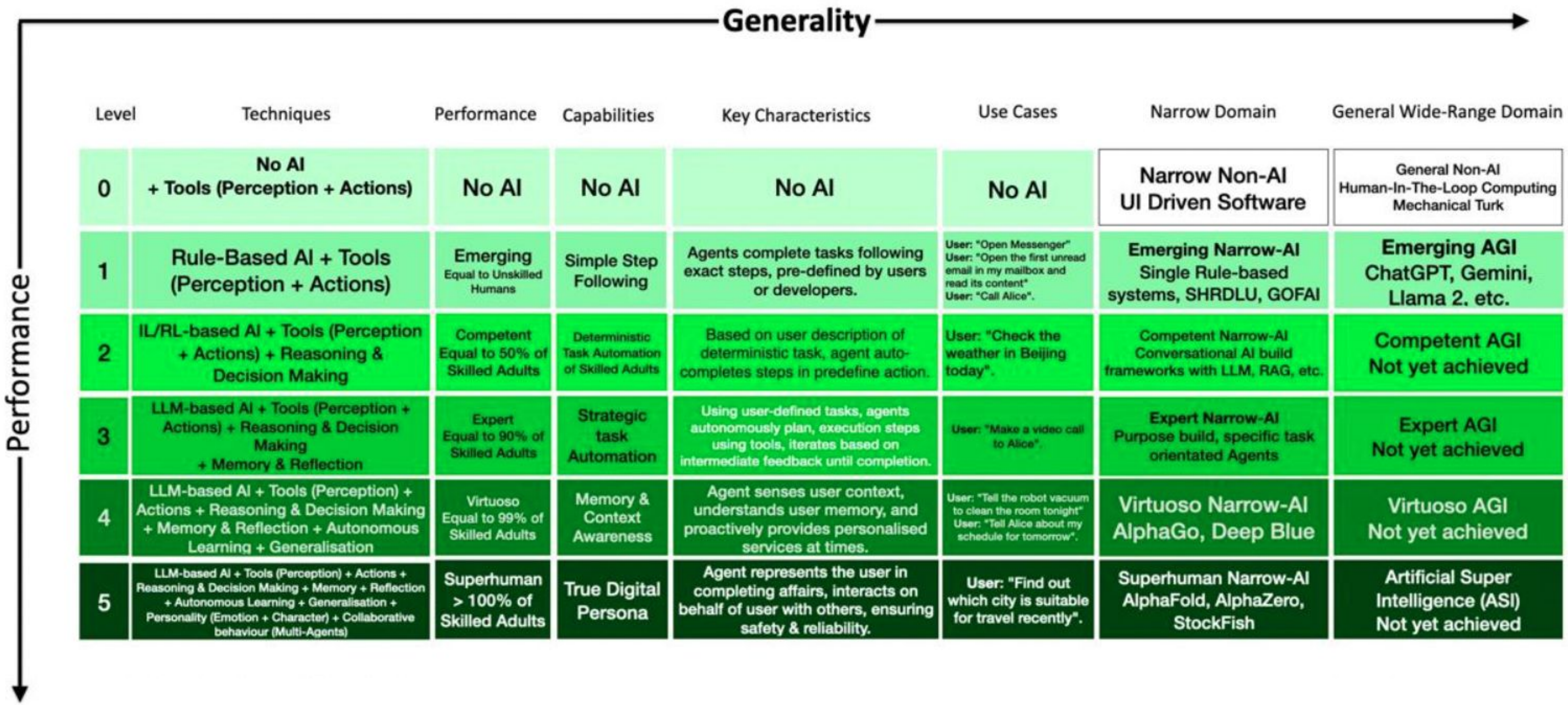
The Rise and Potential of Large Language Model Based Agents: A Survey
https://arxiv.org/pdf/2309.07864

LLM-based Agents


Environment
Look at the sky, do you think it will rain tomorrow? If so, give the umbrella to me.
Reasoning from the current weather conditions and the weather reports on the internet, it is likely to rain tomorrow. Here is your umbrella.
Agent
Perception
Inputs
TXT
...
Action
Text
TXT
Tools
Calling API ...
Embodiment
Brain
Storage
Memory
Knowledge
Summary
Recall
Learn
Retrieve
Decision Making
Planning / Reasoning
Generalize / Transfer

The Rise and Potential of Large Language Model Based Agents: A Survey
https://arxiv.org/pdf/2309.07864

Levels of Agent Autonomy



Generality
Performance

Level	Techniques	Performance	Capabilities	Key Characteristics	Use Cases	Narrow Domain	General Wide-Range Domain
0	No AI + Tools (Perception + Actions)	No AI	No AI	No AI	No AI	Narrow Non-AI UI Driven Software	General Non-AI Human-In-The-Loop Computing Mechanical Turk
1	Rule-Based AI + Tools (Perception + Actions)	Emerging Equal to Unskilled Humans	Simple Step Following	Agents complete tasks following exact steps, pre-defined by users or developers.	User: "Open Messenger" User: "Open the first unread email in my mailbox and read its content" User: "Call Alice".	Emerging Narrow-AI Single Rule-based systems, SHRDLU, GOFAI	Emerging AGI ChatGPT, Gemini, Llama 2. etc.
2	IL/RL-based AI + Tools (Perception + Actions) + Reasoning & Decision Making	Competent Equal to 50% of Skilled Adults	Deterministic Task Automation of Skilled Adults	Based on user description of deterministic task, agent auto-completes steps in predefine action.	User: "Check the weather in Beijing today".	Competent Narrow-AI Conversational AI build frameworks with LLM, RAG, etc.	Competent AGI Not yet achieved
3	LLM-based AI + Tools (Perception + Actions) + Reasoning & Decision Making + Memory & Reflection	Expert Equal to 90% of Skilled Adults	Strategic task Automation	Using user-defined tasks, agents autonomously plan, execution steps using tools, iterates based on intermediate feedback until completion.	User: "Make a video call to Alice".	Expert Narrow-AI Purpose build, specific task orientated Agents	Expert AGI Not yet achieved
4	LLM-based AI + Tools (Perception) + Actions + Reasoning & Decision Making + Memory & Reflection + Autonomous Learning + Generalisation	Virtuoso Equal to 99% of Skilled Adults	Memory & Context Awareness	Agent senses user context, understands user memory, and proactively provides personalised services at times.	User: "Tell the robot vacuum to clean the room tonight" User: "Tell Alice about my schedule for tomorrow".	Virtuoso Narrow-AI AlphaGo, Deep Blue	Virtuoso AGI Not yet achieved
5	LLM-based AI + Tools (Perception) + Actions + Reasoning & Decision Making + Memory + Reflection + Autonomous Learning + Generalisation + Personality (Emotion + Character) + Collaborative behaviour (Multi-Agents)	Superhuman > 100% of Skilled Adults	True Digital Persona	Agent represents the user in completing affairs, interacts on behalf of user with others, ensuring safety & reliability.	User: "Find out which city is suitable for travel recently".	Superhuman Narrow-AI AlphaFold, AlphaZero, StockFish	Artificial Super Intelligence (ASI) Not yet achieved

Levels of AI Agents: from Rules to Large Language Models
https://arxiv.org/pdf/2405.06643

Autonomous Agent

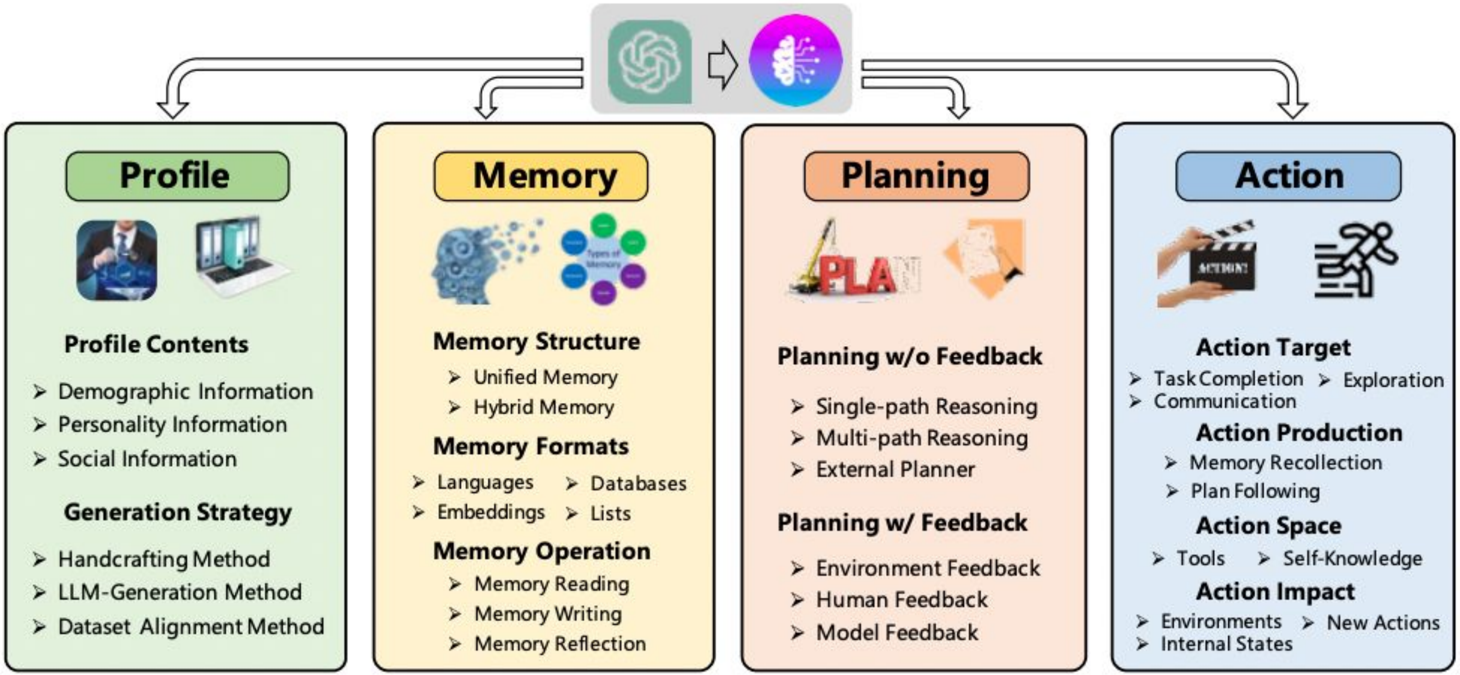
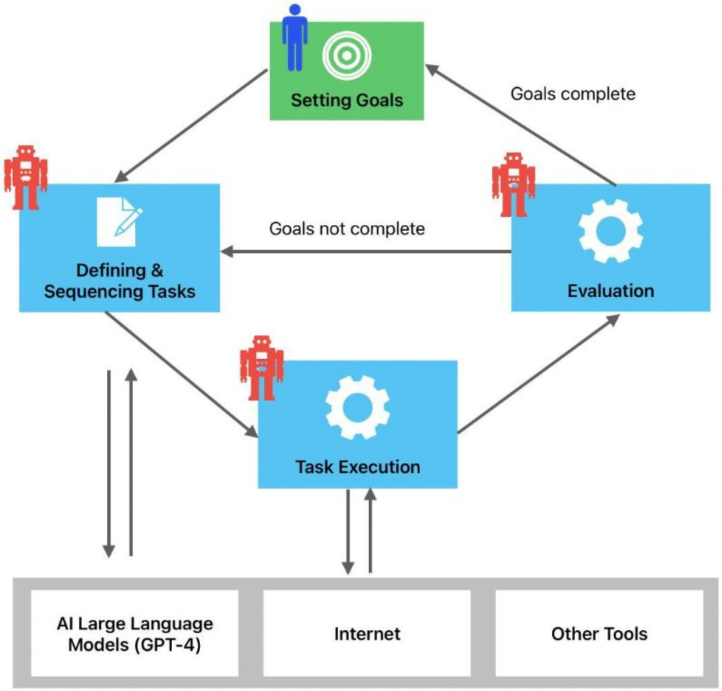


Fig. 2 A unified framework for the architecture design of LLM-based autonomous agent.

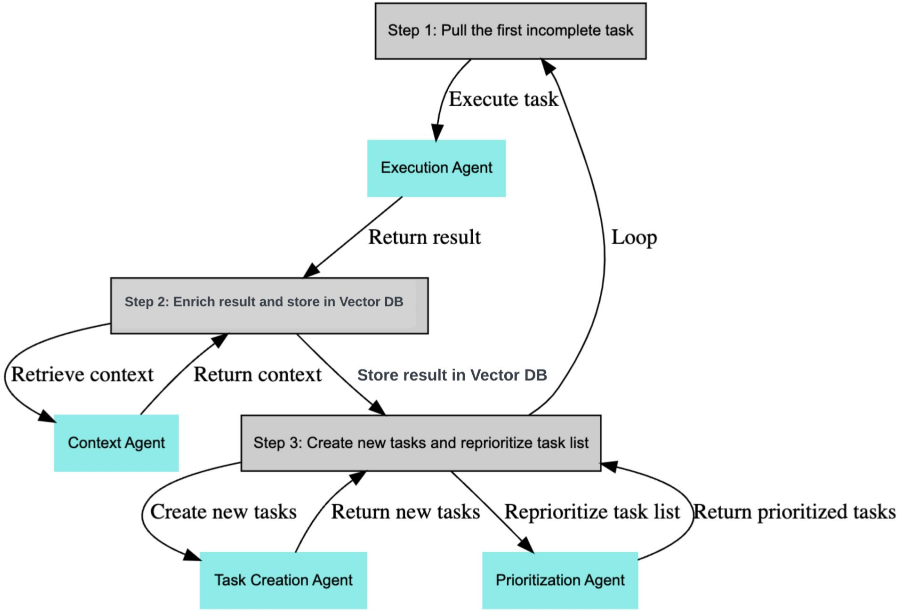
A Survey on Large Language Model based Autonomous Agents
https://arxiv.org/pdf/2308.11432

Autonomous Agent - AutoGPT



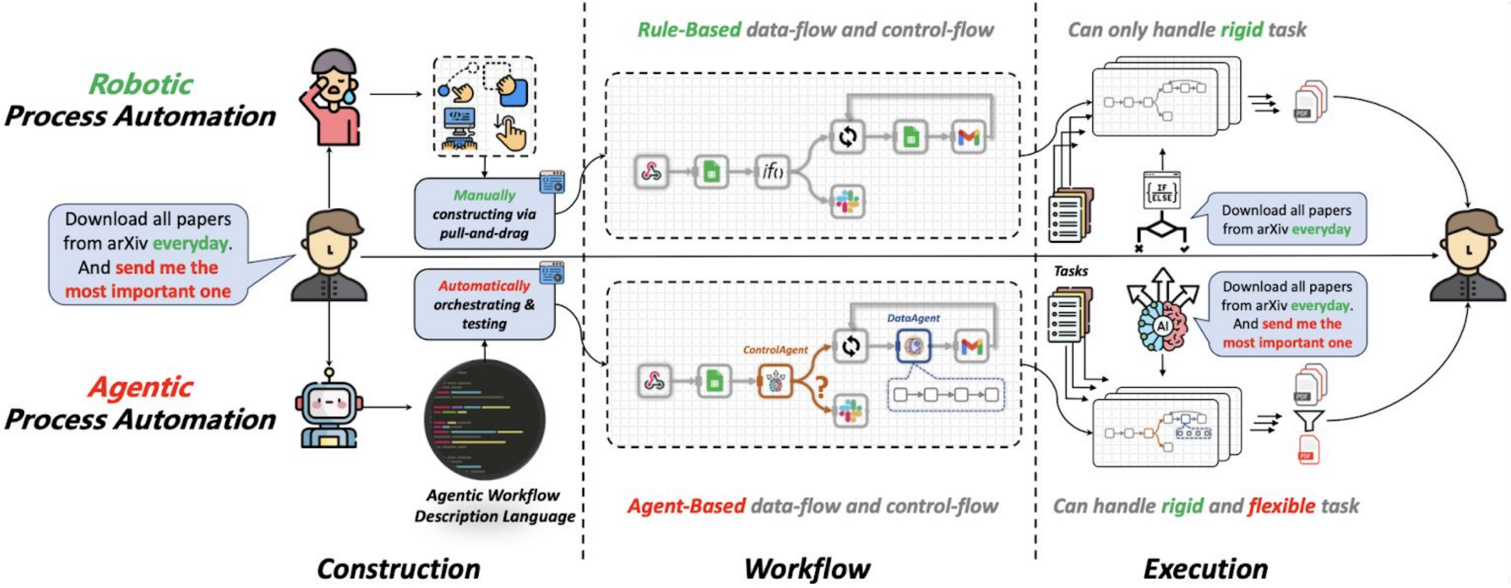
LLM-based AI agent to autonomously accomplish tasks
https://github.com/Significant-Gravitas/AutoGPT

Autonomous Agent - BabyAGI



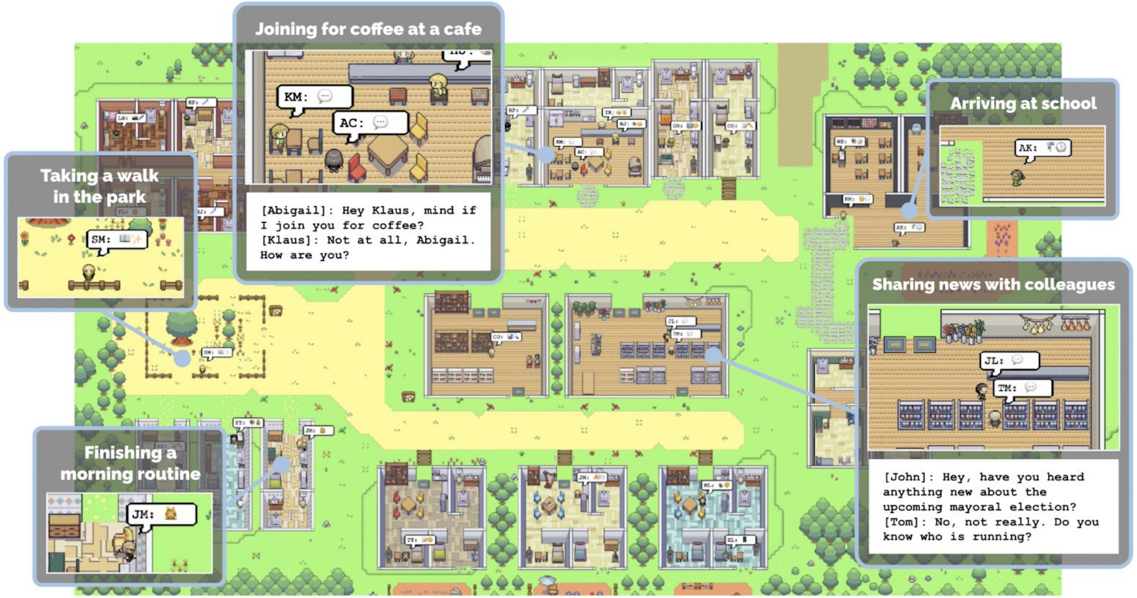
Task-driven Autonomous Agent
https://github.com/yoheinakajima/babyagi

Autonomous Agent - ProAgent


Robotic Process Automation
Download all papers from arXiv everyday. And send me the most important one
Manually constructing via pull-and-drag
Automatically orchestrating & testing
Agentic Process Automation
Agentic Workflow Description Language
Rule-Based data-flow and control-flow
if()
ControlAgent
DataAgent
Agent-Based data-flow and control-flow
Can only handle rigid task
IF ELSE
Download all papers from arXiv everyday
Tasks
AI
Download all papers from arXiv everyday. And send me the most important one
PDF
Can handle rigid and flexible task
Construction
Workflow
Execution

ProAgent: From Robotic Process Automation to Agentic Process Automation
https://arxiv.org/pdf/2311.10751

Multi-Agent Systems - Generative Agents


Joining for coffee at a cafe
KM:
AC:
Taking a walk in the park
SM:
Arriving at school
AK:
Sharing news with colleagues
JL:
TM:
Finishing a morning routine
JM:

[Abigail]: Hey Klaus, mind if I join you for coffee?
[Klaus]: Not at all, Abigail. How are you?

[John]: Hey, have you heard anything new about the upcoming mayoral election?
[Tom]: No, not really. Do you know who is running?

Figure 1: Generative agents are believable simulacra of human behavior for interactive applications. In this work, we demonstrate generative agents by populating a sandbox environment, reminiscent of The Sims, with twenty-five agents. Users can observe and intervene as agents plan their days, share news, form relationships, and coordinate group activities.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - Generative Agents

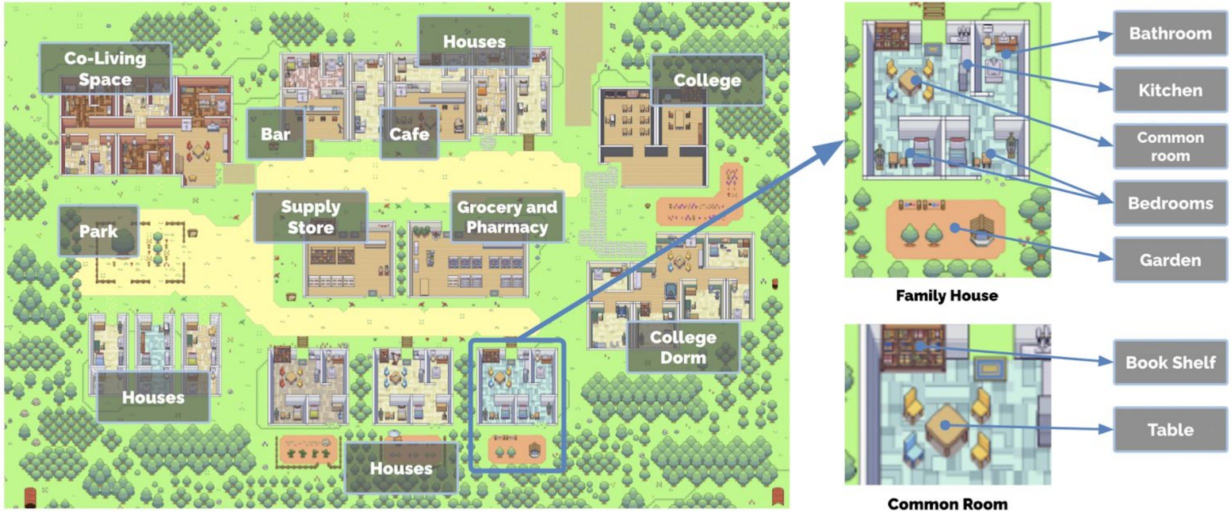


Figure 2: The Smallville sandbox world, with areas labeled. The root node describes the entire world, children describe areas (e.g., houses, cafe, stores), and leaf nodes describe objects (e.g., table, bookshelf). Agents remember a subgraph that reflects the parts of the world they have seen, maintaining the state of those parts as they observed them.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - Generative Agents

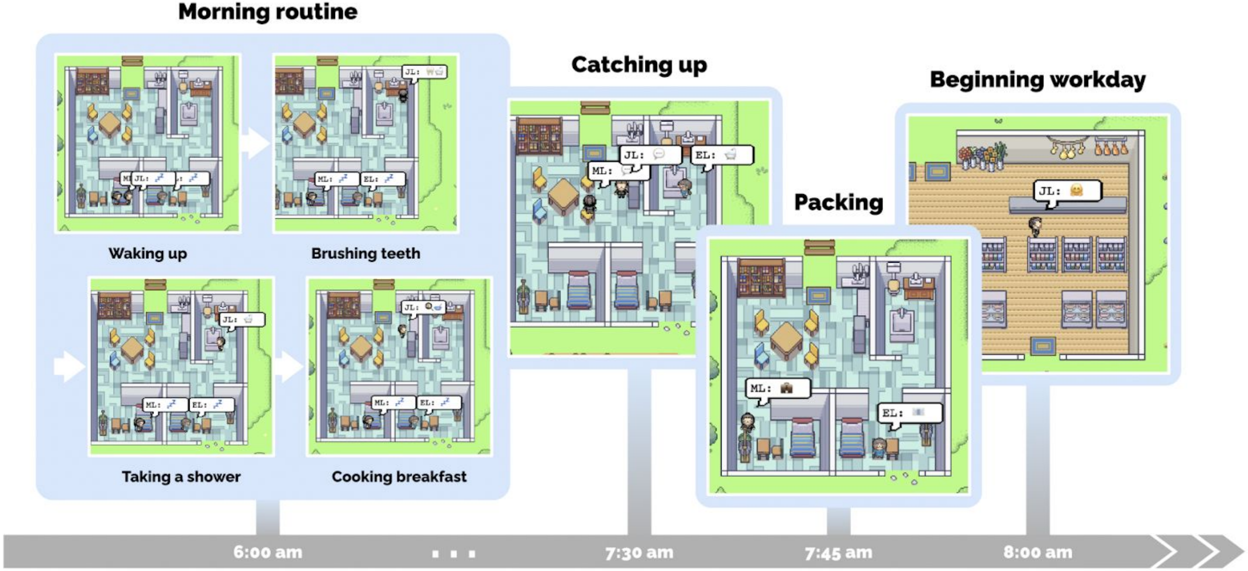


Figure 3: A morning in the life of a generative agent, John Lin. John wakes up around 6 am and completes his morning routine, which includes brushing his teeth, taking a shower, and eating breakfast. He briefly catches up with his wife, Mei, and son, Eddy, before heading out to begin his workday.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - Generative Agents

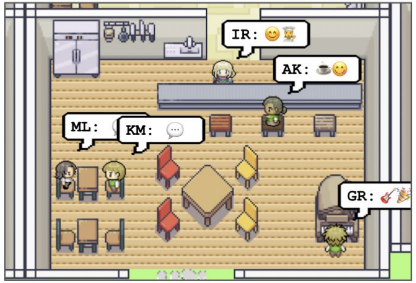


Figure 4: At the beginning of the simulation, one agent is initialized with an intent to organize a Valentine's Day party. Despite many possible points of failure in the ensuing chain of events—agents might not act on that intent, might forget to tell others, might not remember to show up—the Valentine's Day party does, in fact, occur, with a number of agents gathering and interacting.

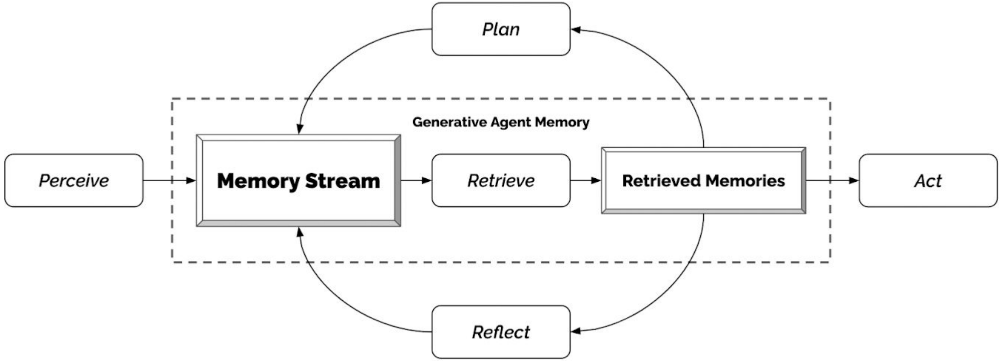
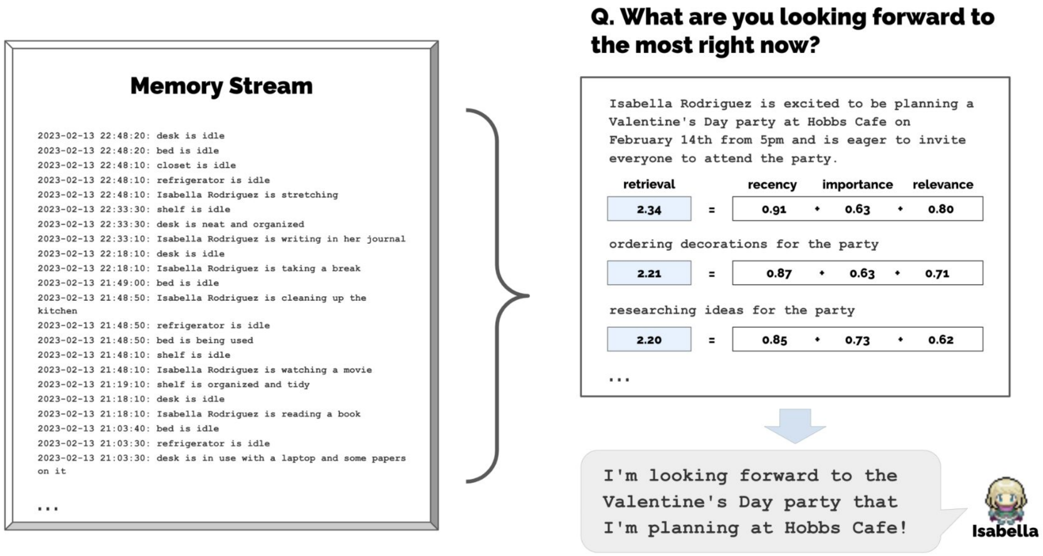


Figure 5: Our generative agent architecture. Agents perceive their environment, and all perceptions are saved in a comprehensive record of the agent's experiences called the memory stream. Based on their perceptions, the architecture retrieves relevant memories and uses those retrieved actions to determine an action. These retrieved memories are also used to form longer-term plans and create higher-level reflections, both of which are entered into the memory stream for future use.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - Generative Agents



Memory Stream

```
2023-02-13 22:48:20: desk is idle
2023-02-13 22:48:20: bed is idle
2023-02-13 22:48:10: closet is idle
2023-02-13 22:48:10: refrigerator is idle
2023-02-13 22:48:10: Isabella Rodriguez is stretching
2023-02-13 22:33:30: shelf is idle
2023-02-13 22:33:30: desk is neat and organized
2023-02-13 22:33:10: Isabella Rodriguez is writing in her journal
2023-02-13 22:18:10: desk is idle
2023-02-13 22:18:10: Isabella Rodriguez is taking a break
2023-02-13 21:49:00: bed is idle
2023-02-13 21:48:50: Isabella Rodriguez is cleaning up the
kitchen
2023-02-13 21:48:50: refrigerator is idle
2023-02-13 21:48:50: bed is being used
2023-02-13 21:48:10: shelf is idle
2023-02-13 21:48:10: Isabella Rodriguez is watching a movie
2023-02-13 21:19:10: shelf is organized and tidy
2023-02-13 21:18:10: desk is idle
2023-02-13 21:18:10: Isabella Rodriguez is reading a book
2023-02-13 21:03:40: bed is idle
2023-02-13 21:03:30: refrigerator is idle
2023-02-13 21:03:30: desk is in use with a laptop and some papers
on it

...
```

Q. What are you looking forward to the most right now?

Isabella Rodriguez is excited to be planning a Valentine's Day party at Hobbs Cafe on February 14th from 5pm and is eager to invite everyone to attend the party.

retrieval		recency		importance		relevance
2.34	=	0.91	+	0.63	+	0.80

ordering decorations for the party

retrieval		recency		importance		relevance
2.21	=	0.87	+	0.63	+	0.71

researching ideas for the party

retrieval		recency		importance		relevance
2.20	=	0.85	+	0.73	+	0.62

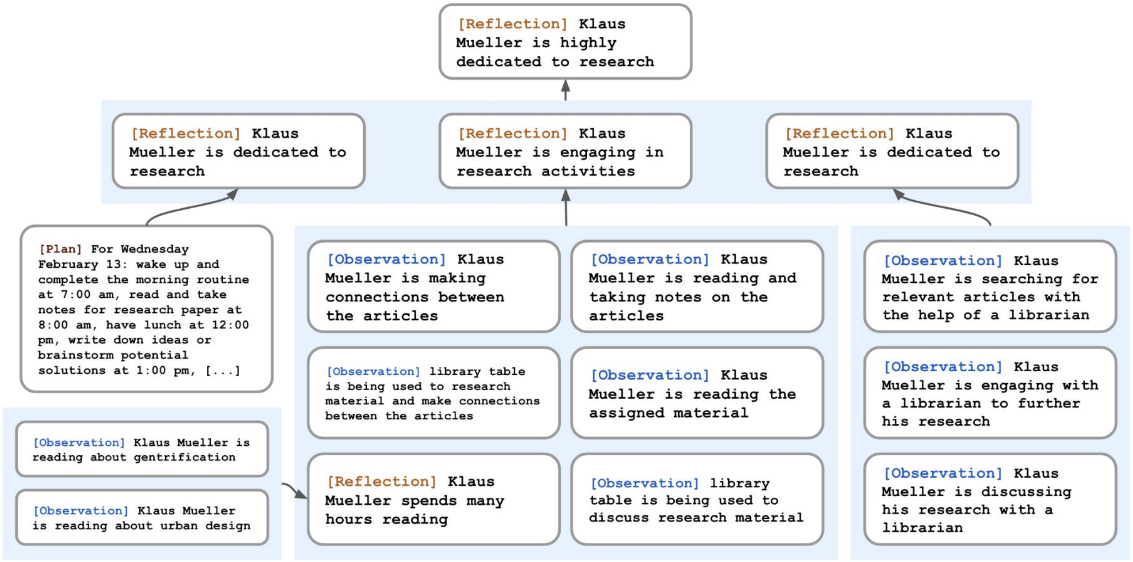
...

I'm looking forward to the Valentine's Day party that I'm planning at Hobbs Cafe!

Figure 6: The memory stream comprises a large number of observations that are relevant and irrelevant to the agent's current situation. Retrieval identifies a subset of these observations that should be passed to the language model to condition its response to the situation.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - Generative Agents



[Reflection] Klaus Mueller is highly dedicated to research

[Reflection] Klaus Mueller is dedicated to research

[Reflection] Klaus Mueller is engaging in research activities

[Reflection] Klaus Mueller is dedicated to research

[Plan] For Wednesday February 13: wake up and complete the morning routine at 7:00 am, read and take notes for research paper at 8:00 am, have lunch at 12:00 pm, write down ideas or brainstorm potential solutions at 1:00 pm, [...]

[Observation] Klaus Mueller is reading about gentrification

[Observation] Klaus Mueller is reading about urban design

[Observation] Klaus Mueller is making connections between the articles

[Observation] library table is being used to research material and make connections between the articles

[Reflection] Klaus Mueller spends many hours reading

[Observation] Klaus Mueller is reading and taking notes on the articles

[Observation] Klaus Mueller is reading the assigned material

[Observation] library table is being used to discuss research material

[Observation] Klaus Mueller is searching for relevant articles with the help of a librarian

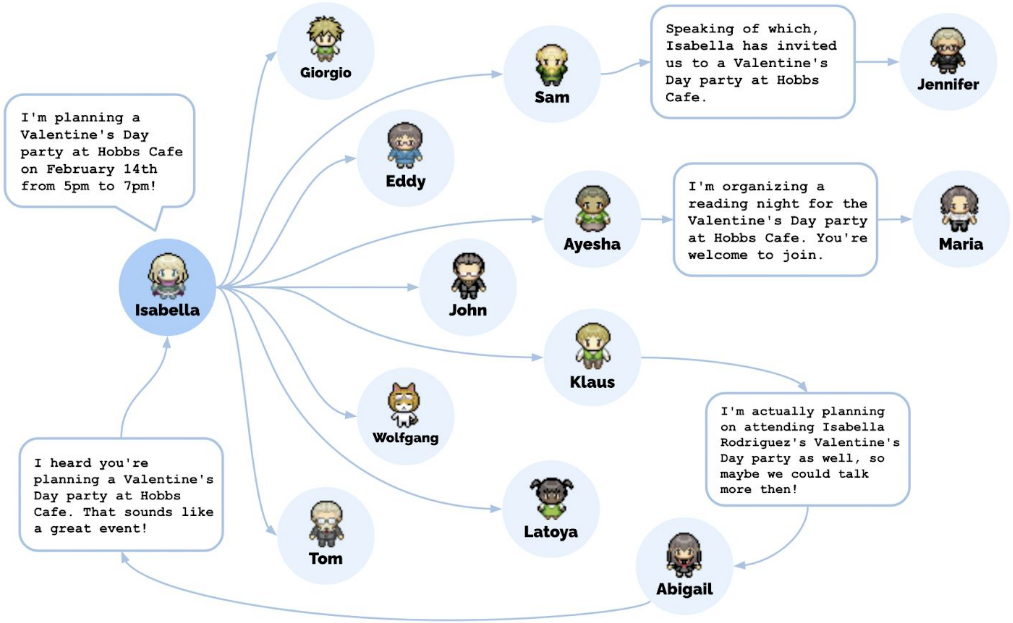
[Observation] Klaus Mueller is engaging with a librarian to further his research

[Observation] Klaus Mueller is discussing his research with a librarian

Figure 7: A reflection tree for Klaus Mueller. The agent's observations of the world, represented in the leaf nodes, are recursively synthesized to derive Klaus's self-notion that he is highly dedicated to his research.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - Generative Agents



I'm planning a Valentine's Day party at Hobbs Cafe on February 14th from 5pm to 7pm!

Speaking of which, Isabella has invited us to a Valentine's Day party at Hobbs Cafe.

I'm organizing a reading night for the Valentine's Day party at Hobbs Cafe. You're welcome to join.

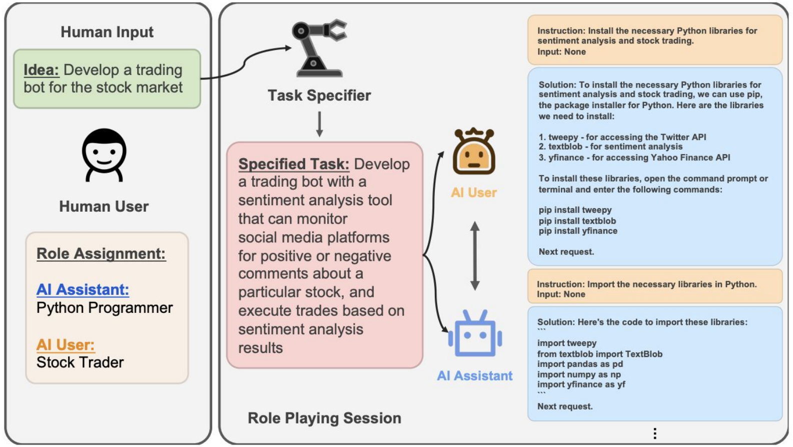
I'm actually planning on attending Isabella Rodriguez's Valentine's Day party as well, so maybe we could talk more then!

I heard you're planning a Valentine's Day party at Hobbs Cafe. That sounds like a great event!

Figure 9: The diffusion path for Isabella Rodriguez's Valentine's Day party invitation involved a total of 12 agents, aside from Isabella, who heard about the party at Hobbs Cafe by the end of the simulation.

Generative Agents: Interactive Simulacra of Human Behavior
https://arxiv.org/pdf/2304.03442.pdf

Multi-Agent Systems - CAMEL



Idea: Develop a trading bot for the stock market

Role Assignment:

AI Assistant: Python Programmer

AI User: Stock Trader

Specified Task: Develop a trading bot with a sentiment analysis tool that can monitor social media platforms for positive or negative comments about a particular stock, and execute trades based on sentiment analysis results

Instruction: Install the necessary Python libraries for sentiment analysis and stock trading.
Input: None

Solution: To install the necessary Python libraries for sentiment analysis and stock trading, we can use pip, the package installer for Python. Here are the libraries we need to install:

1. tweepy - for accessing the Twitter API
2. textblob - for sentiment analysis
3. yfinance - for accessing Yahoo Finance API

To install these libraries, open the command prompt or terminal and enter the following commands:

```
pip install tweepy
pip install textblob
pip install yfinance
```

Next request.

Instruction: Import the necessary libraries in Python.
Input: None

Solution: Here's the code to import these libraries:

~~~
```
import tweepy
from textblob import TextBlob
import pandas as pd
import numpy as np
import yfinance as yf
```
~~~

Next request.

⋮

Figure 1: **CAMEL Role-Playing Framework.** Our role-playing setup starts with the human user having an idea they want to implement, e.g. develop a trading bot for the stock market. The roles involved in this task would be an AI assistant agent who is a python programmer and an AI user agent who is a stock trader. The task is made more specific using our task specifier agent, leading to a well-defined task for the assistant to solve. Both AI user and AI assistant are provided with the specified task, after which they collaboratively communicate by chatting with each other in an instruction-following fashion to solve the specified task.

CAMEL: Communicative Agents for “Mind” Exploration of Large Language Model Society
https://arxiv.org/pdf/2303.17760

Multi-Agent Systems - ChatDev

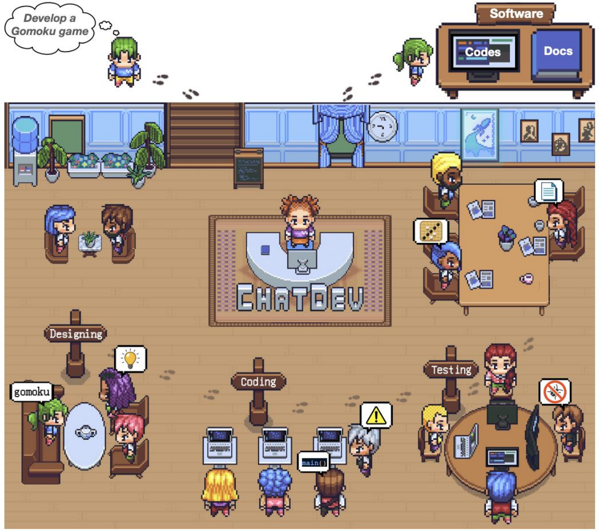


Figure 1: ChatDev, a chat-powered software development framework, integrates LLM agents with various social roles, working autonomously to develop comprehensive solutions via multi-agent collaboration.

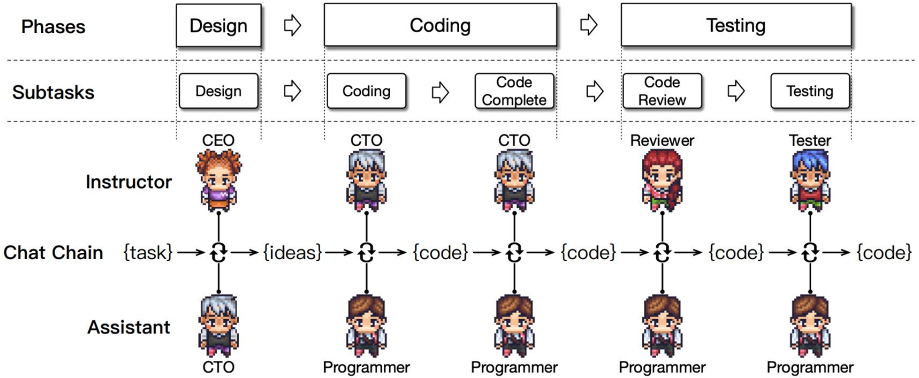


Figure 2: Upon receiving a preliminary task requirement (*e.g.*, "*develop a Gomoku game*"), these software agents engage in multi-turn communication and perform instruction-following along a chain-structured workflow, collaborating to execute a series of subtasks autonomously to craft a comprehensive solution.

ChatDev: Communicative Agents for Software Development
https://arxiv.org/pdf/2307.07924

Multi-Agent Systems - AgentVerse

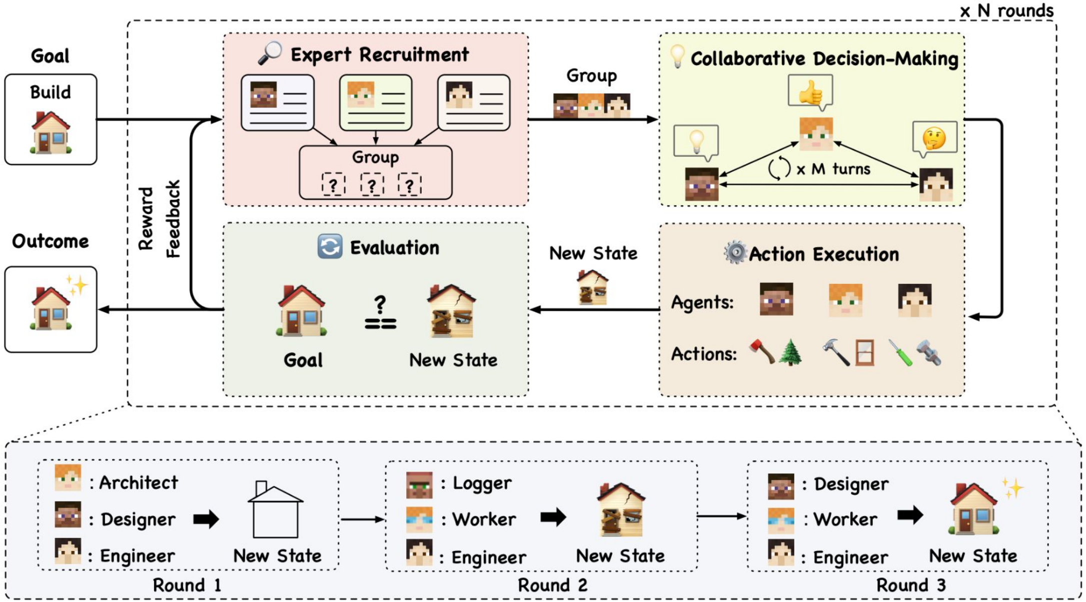
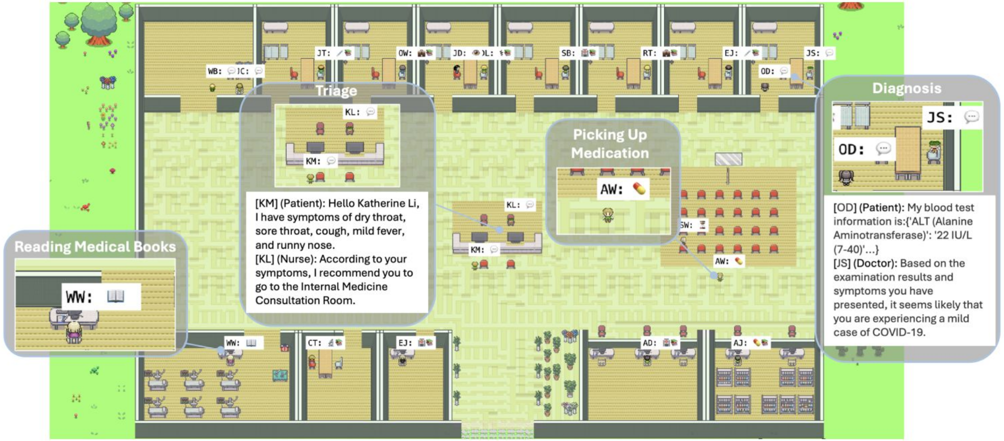


Figure 1: An illustration of the AGENTVERSE.

AgentVerse: Facilitating Multi-Agent Collaboration and Exploring Emergent Behaviors
https://arxiv.org/abs/2308.10848

Multi-Agent Systems - Agent Hospital



[KM] (Patient): Hello Katherine Li, I have symptoms of dry throat, sore throat, cough, mild fever, and runny nose.
[KL] (Nurse): According to your symptoms, I recommend you to go to the Internal Medicine Consultation Room.

[OD] (Patient): My blood test information is:{'ALT (Alanine Aminotransferase)': '22 IU/L (7-40)'...}
[JS] (Doctor): Based on the examination results and symptoms you have presented, it seems likely that you are experiencing a mild case of COVID-19.

Fig. 1. An overview of `Agent Hospital`. It is a simulacrum of hospital in which patients, nurses, and doctors are autonomous agents powered by large language models. Agent Hospital simulates the whole closed cycle of treating a patient's illness: disease onset, triage, registration, consultation, medical examination, diagnosis, medicine dispensary, convalescence, and post-hospital follow-up visit. An interesting finding is that the doctor agents can keep improving treatment performance over time without manually labeled data, both in simulation and real-world evaluations.

Agent Hospital: A Simulacrum of Hospital with Evolvable Medical Agents
https://arxiv.org/pdf/2405.02957

Multi-Agent Systems - Agent Hospital

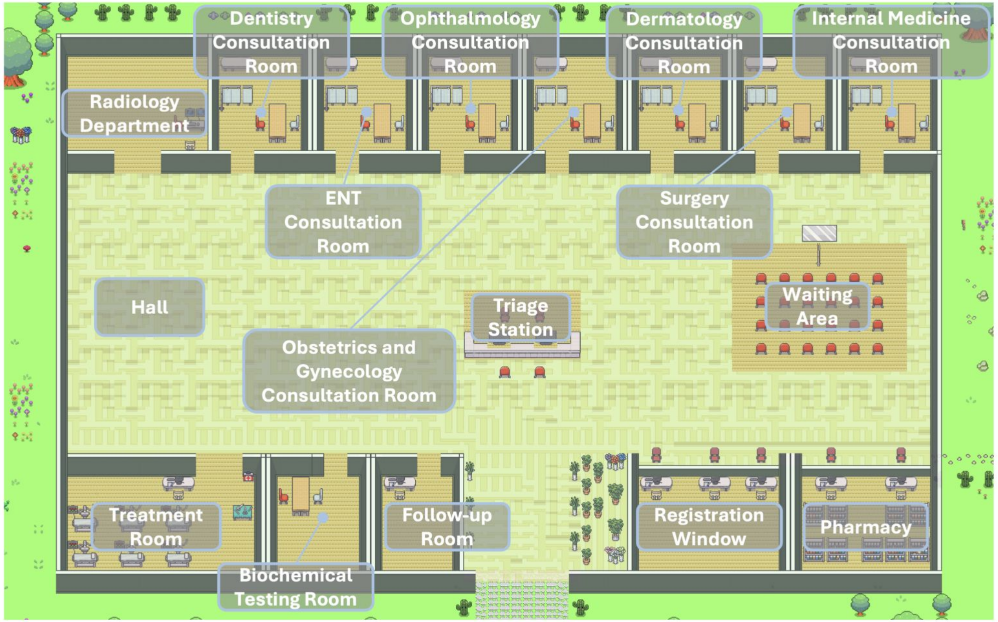
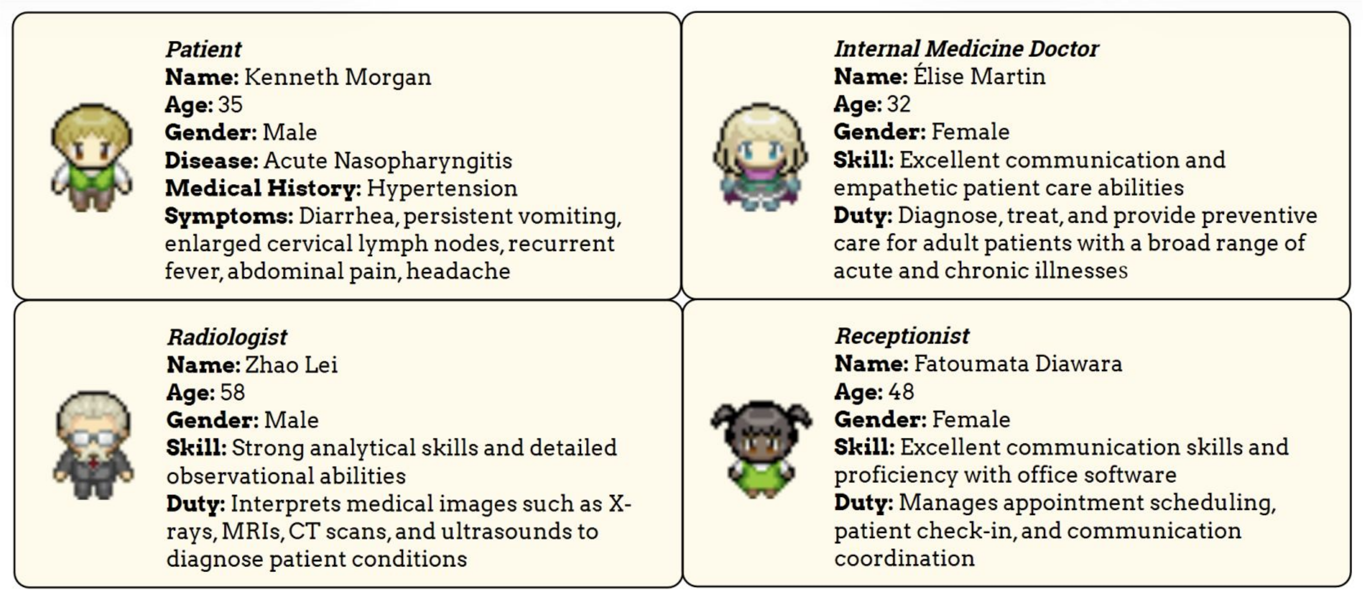

Dentistry Consultation Room
Ophthalmology Consultation Room
Dermatology Consultation Room
Internal Medicine Consultation Room
Radiology Department
ENT Consultation Room
Surgery Consultation Room
Hall
Triage Station
Waiting Area
Obstetrics and Gynecology Consultation Room
Treatment Room
Follow-up Room
Registration Window
Pharmacy
Biochemical Testing Room

Fig. 2. The distribution of various areas within Agent Hospital.

Agent Hospital: A Simulacrum of Hospital with Evolvable Medical Agents
https://arxiv.org/pdf/2405.02957

Multi-Agent Systems - Agent Hospital



Patient
Name: Kenneth Morgan
Age: 35
Gender: Male
Disease: Acute Nasopharyngitis
Medical History: Hypertension
Symptoms: Diarrhea, persistent vomiting, enlarged cervical lymph nodes, recurrent fever, abdominal pain, headache

Internal Medicine Doctor
Name: Élise Martin
Age: 32
Gender: Female
Skill: Excellent communication and empathetic patient care abilities
Duty: Diagnose, treat, and provide preventive care for adult patients with a broad range of acute and chronic illnesses

Radiologist
Name: Zhao Lei
Age: 58
Gender: Male
Skill: Strong analytical skills and detailed observational abilities
Duty: Interprets medical images such as X-rays, MRIs, CT scans, and ultrasounds to diagnose patient conditions

Receptionist
Name: Fatoumata Diawara
Age: 48
Gender: Female
Skill: Excellent communication skills and proficiency with office software
Duty: Manages appointment scheduling, patient check-in, and communication coordination

Fig. 3. Example agents in `Agent Hospital`.

Agent Hospital: A Simulacrum of Hospital with Evolvable Medical Agents
https://arxiv.org/pdf/2405.02957

Multi-Agent Systems - Agent Hospital

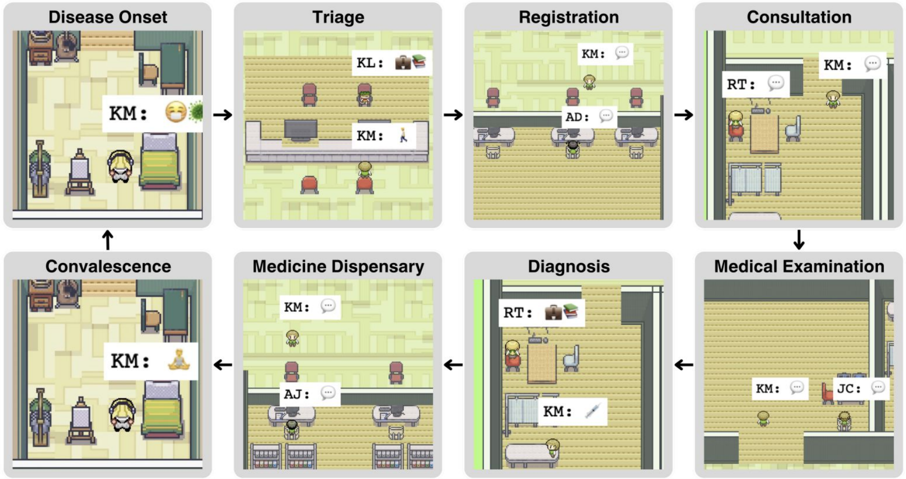


Fig. 4. Resident agent Kenneth Morgan falls ill and visits the Agent Hospital. Triage nurse Katherine Li conducts an initial evaluation of Mr. Morgan's symptoms and refers him to the dermatology department. Mr. Morgan then registers at the hospital's counter and is subsequently arranged for a consultation with dermatologist Robert Thompson. After undergoing the prescribed medical examination, Mr. Morgan receives a diagnosis and medication. He returns home to rest and monitor the improvement of his condition.

Agent Hospital: A Simulacrum of Hospital with Evolvable Medical Agents
https://arxiv.org/pdf/2405.02957

Multi-Agent Systems - Agent Hospital

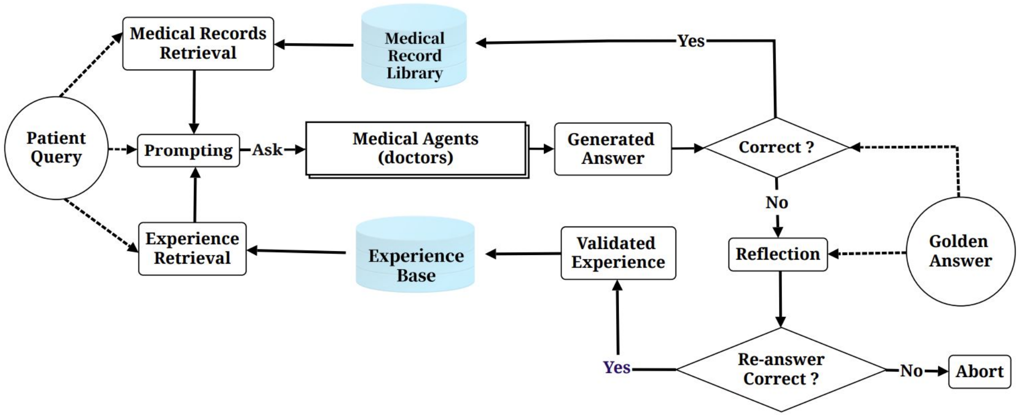


Fig. 5. The overview of the MedAgent-Zero method. This diagram illustrates the method by which doctors achieve self-evolution: 1) Accumulating examples and summarizing experience; 2) Adding correct responses directly to the example library; 3) Summarizing experience from incorrect responses and retesting them; 4) Incorporating successful experience into the experience library after further abstraction; 5) Utilizing both libraries to retrieve the most similar content for reasoning during the inference process.

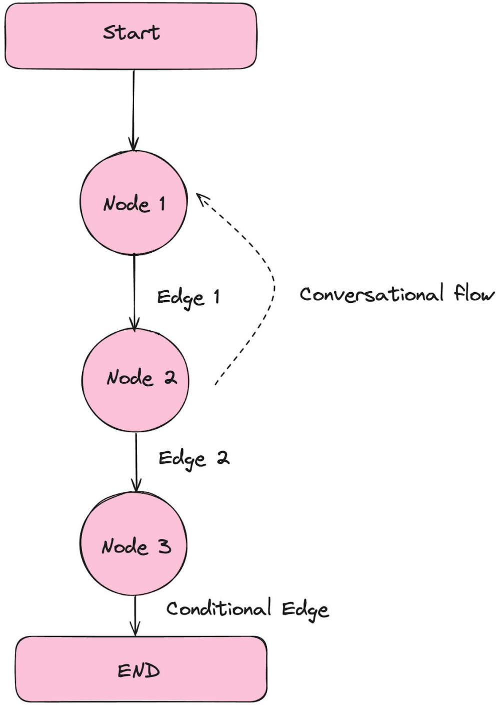
Agent Hospital: A Simulacrum of Hospital with Evolvable Medical Agents
https://arxiv.org/pdf/2405.02957

Multi-Agent Systems - LangGraph

States - a general data structure representing the current snapshot of the application

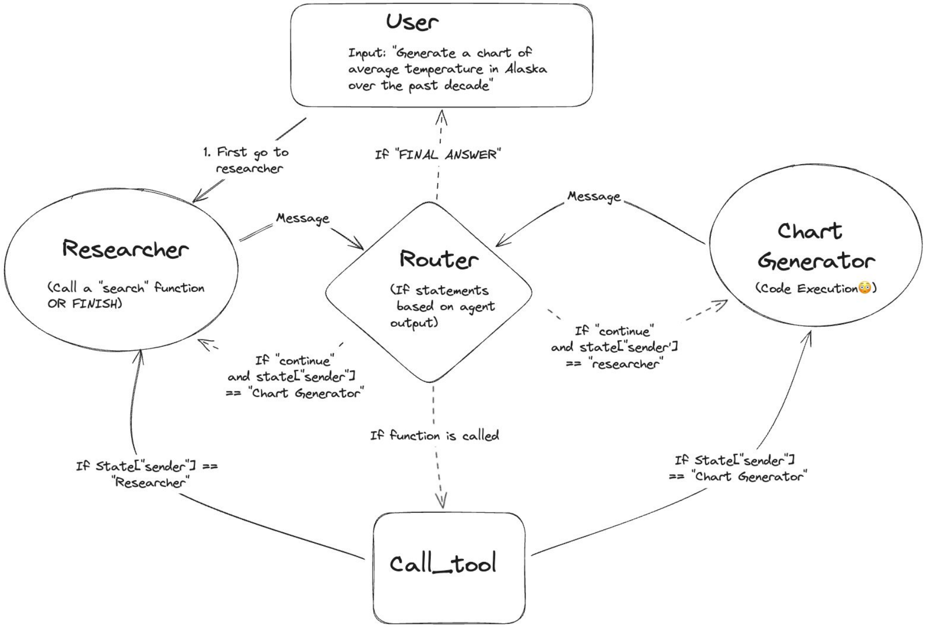
Nodes - implement the logic of agents that receive the current state, perform computations, and return the updated state

Edges - determine the next node to execute based on the current state



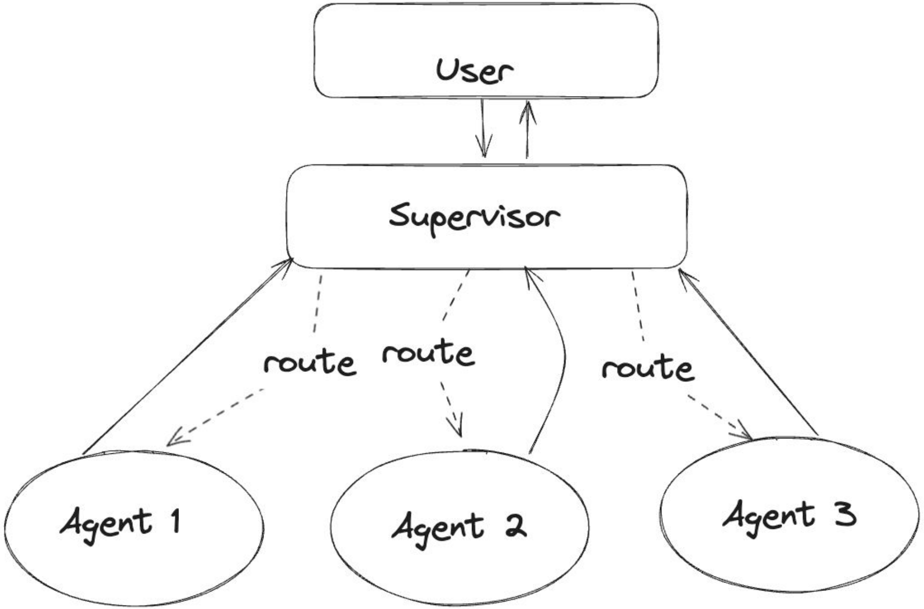
LangGraph
https://www.langchain.com/langgraph

Multi-Agent Systems - LangGraph


User
Input: "Generate a chart of average temperature in Alaska over the past decade"
1. First go to researcher
If "FINAL ANSWER"
Message
Message
Researcher
(Call a "search" function OR FINISH)
Router
(If statements based on agent output)
Chart Generator
(Code Execution😳)
If "continue" and state["sender"] == "Chart Generator"
If "continue" and state["sender'] == "researcher"
If function is called
If State["sender"] == "Researcher"
If State["sender"] == "Chart Generator"
Call_tool

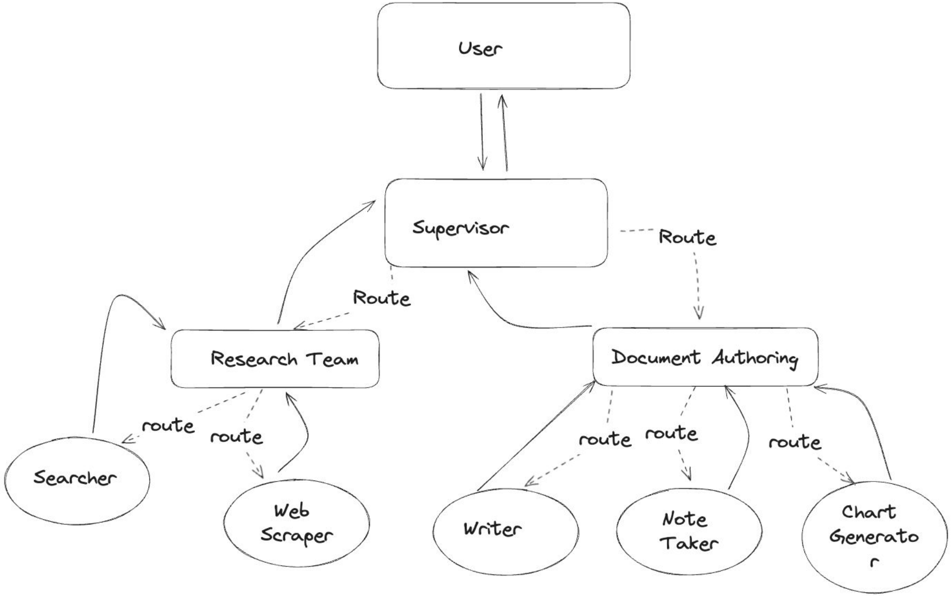
LangGraph
https://www.langchain.com/langgraph

Multi-Agent Systems - LangGraph



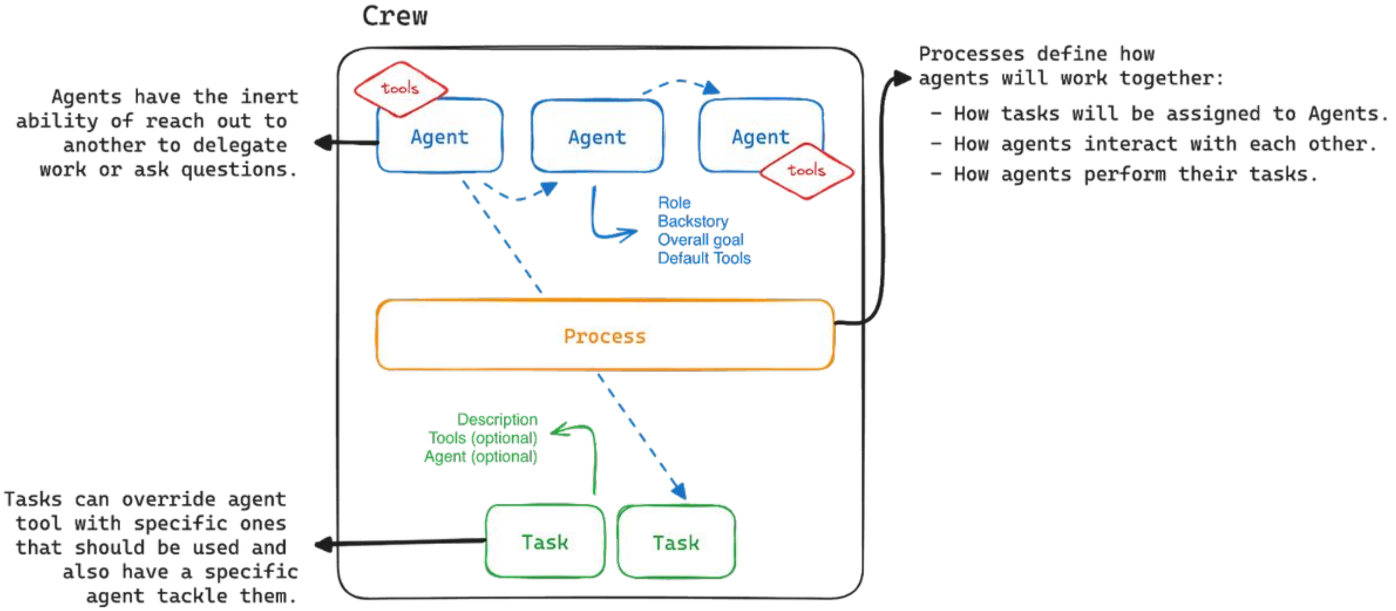
LangGraph
https://www.langchain.com/langgraph

Multi-Agent Systems - LangGraph



LangGraph
https://www.langchain.com/langgraph

Multi-Agent Systems - CrewAI



Agents have the inert ability of reach out to another to delegate work or ask questions.

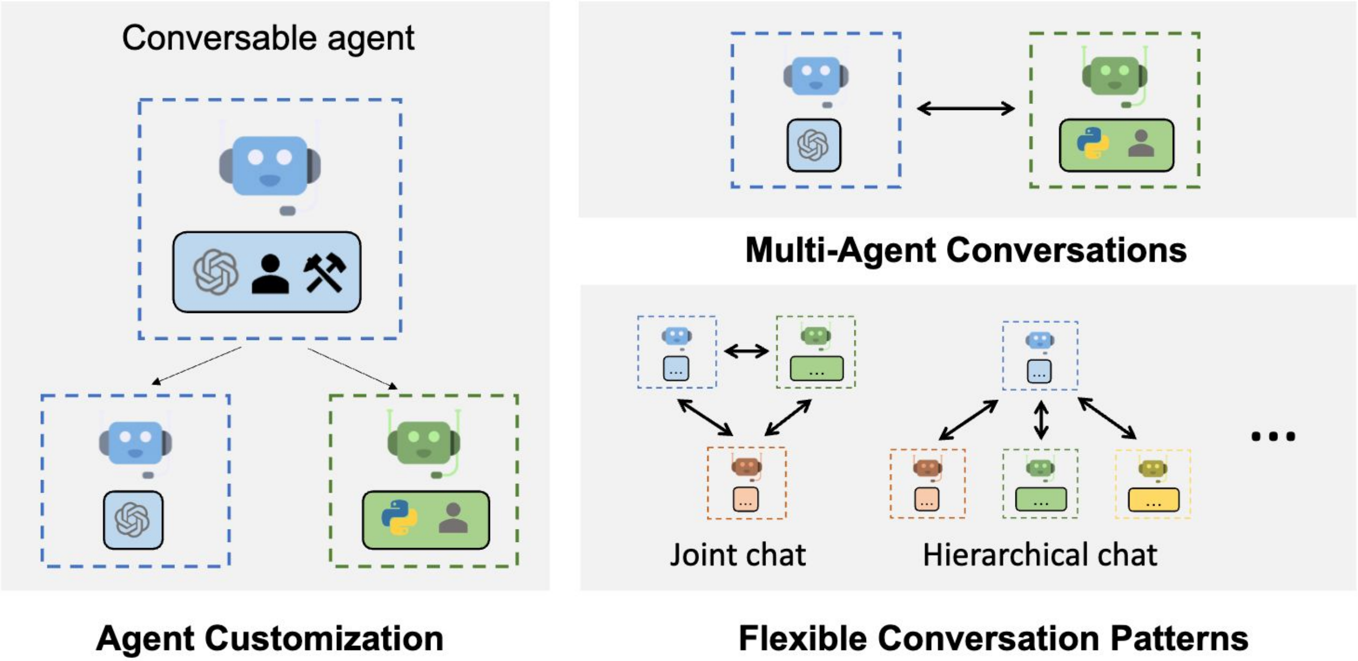
Processes define how agents will work together:

- How tasks will be assigned to Agents.
- How agents interact with each other.
- How agents perform their tasks.

Tasks can override agent tool with specific ones that should be used and also have a specific agent tackle them.

CrewAI
https://github.com/joaomdmoura/crewAI

Multi-Agent Systems - AutoGen



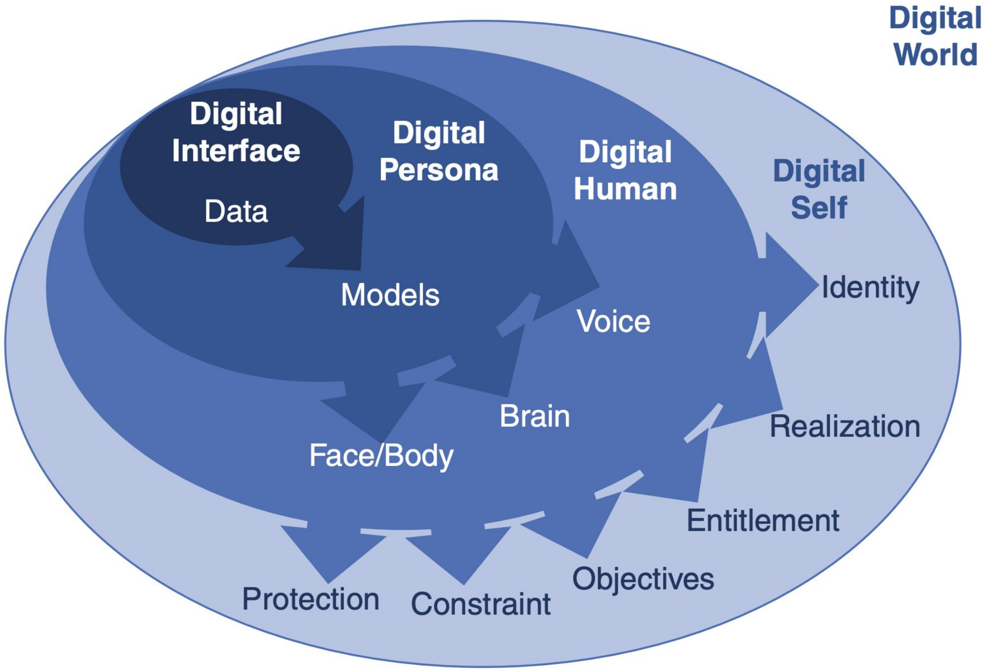
AutoGen
https://arxiv.org/pdf/2308.08155

Multi-Agent Systems - Comparison of Tools

Criterion / Tool	LangGraph	CrewAI	AutoGen
Key Features	Graph-based agents	Role-playing agents	Conversational agents
Autonomy	Conditionally autonomous	High autonomy	High autonomy
Interactions	Conditional graphs with cyclic execution	Autonomous agents with roles and goals	Centralized group chat
Execution	All agents perform functions	Dynamic delegation, but hierarchical processes can be defined	Managed by a separate agent
Use Cases	Detailed management scenarios	From development to production	Experiments, prototyping, conversational patterns

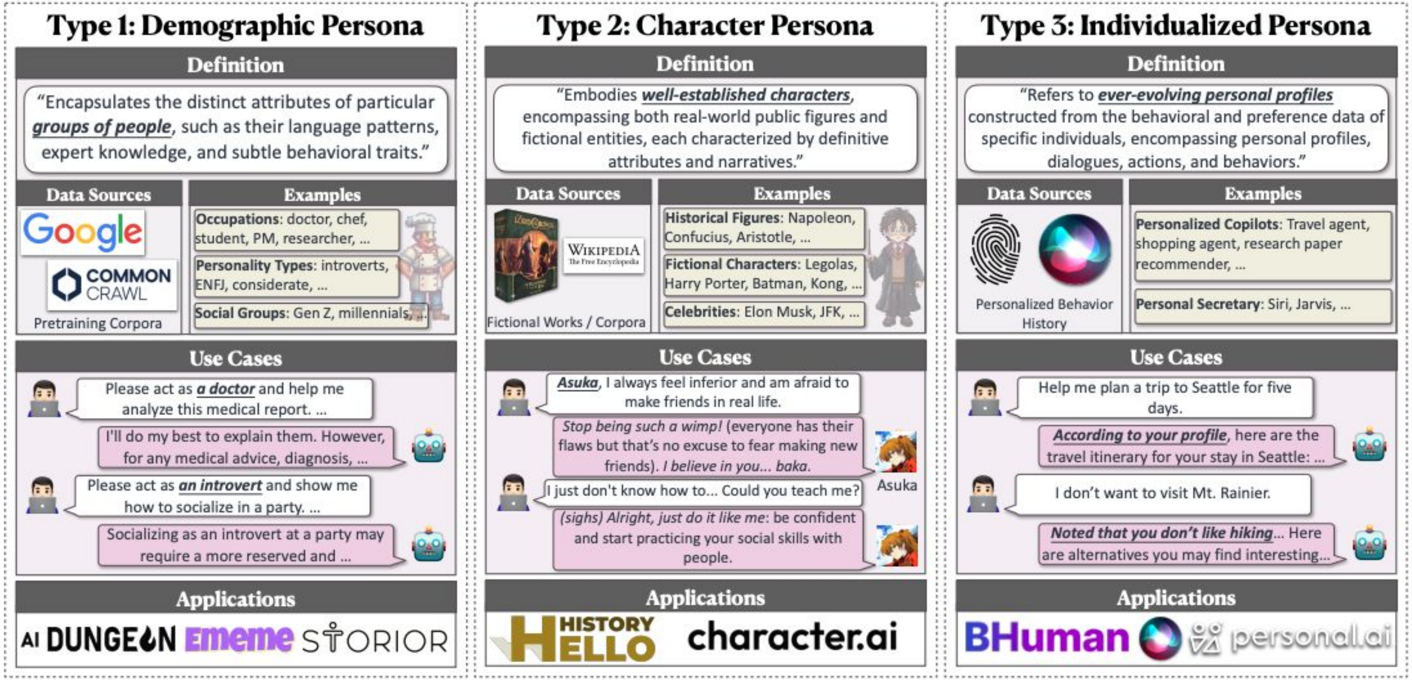
https://sajalsharma.com/posts/overview-multi-agent-fameworks/

Personalization of Agents



Digital Self: The Next Evolution of the Digital Human
https://www.computer.org/csdl/magazine/co/2022/04/09755221/1CubyPYgCeA

Personalization of Agents - Digital Persona



Type 1: Demographic Persona

Definition

"Encapsulates the distinct attributes of particular ***groups of people***, such as their language patterns, expert knowledge, and subtle behavioral traits."

Data Sources

Google
COMMON CRAWL
Pretraining Corpora

Examples

Occupations: doctor, chef, student, PM, researcher, ...

Personality Types: introverts, ENFJ, considerate, ...

Social Groups: Gen Z, millennials, ...

Use Cases

Please act as ***a doctor*** and help me analyze this medical report. ...

I'll do my best to explain them. However, for any medical advice, diagnosis, ...

Please act as ***an introvert*** and show me how to socialize in a party. ...

Socializing as an introvert at a party may require a more reserved and ...

Applications

AI DUNGEON Ememe STORIOR

Type 2: Character Persona

Definition

"Embodies ***well-established characters***, encompassing both real-world public figures and fictional entities, each characterized by definitive attributes and narratives."

Data Sources

WIKIPEDIA The Free Encyclopedia
Fictional Works / Corpora

Examples

Historical Figures: Napoleon, Confucius, Aristotle, ...

Fictional Characters: Legolas, Harry Porter, Batman, Kong, ...

Celebrities: Elon Musk, JFK, ...

Use Cases

Asuka, I always feel inferior and am afraid to make friends in real life.

Stop being such a wimp! (everyone has their flaws but that's no excuse to fear making new friends). *I believe in you... baka.*

I just don't know how to... Could you teach me?

Asuka

(sighs) Alright, just do it like me: be confident and start practicing your social skills with people.

Applications

HISTORY HELLO character.ai

Type 3: Individualized Persona

Definition

"Refers to ***ever-evolving personal profiles*** constructed from the behavioral and preference data of specific individuals, encompassing personal profiles, dialogues, actions, and behaviors."

Data Sources

Personalized Behavior History

Examples

Personalized Copilots: Travel agent, shopping agent, research paper recommender, ...

Personal Secretary: Siri, Jarvis, ...

Use Cases

Help me plan a trip to Seattle for five days.

According to your profile, here are the travel itinerary for your stay in Seattle: ...

I don't want to visit Mt. Rainier.

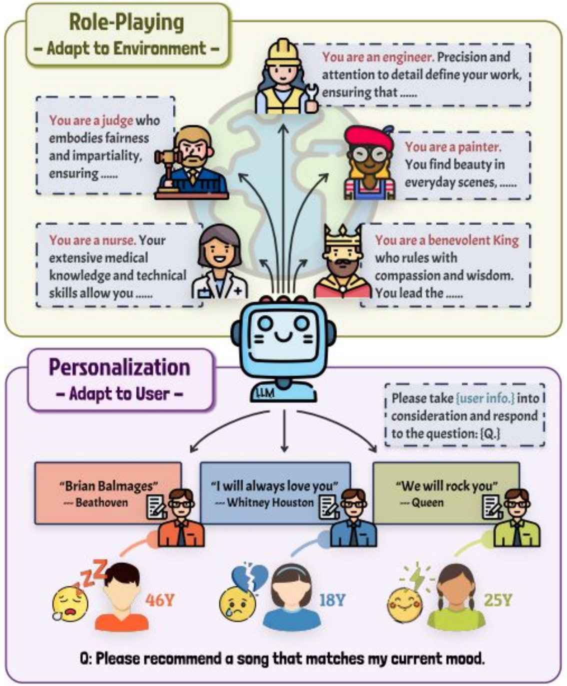
Noted that you don't like hiking... Here are alternatives you may find interesting...

Applications

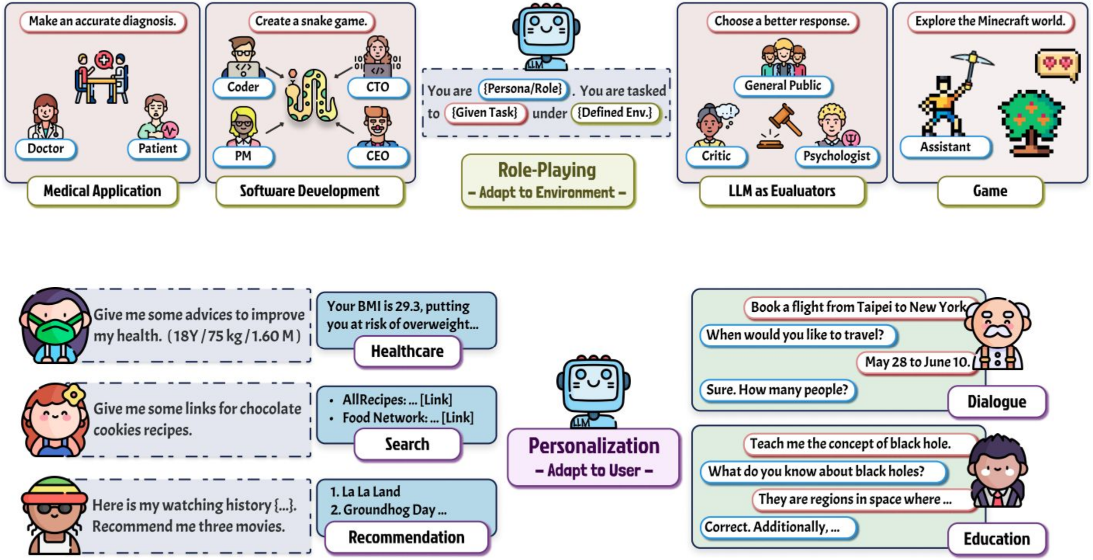
BHuman personal.ai

From Persona to Personalization: A Survey on Role-Playing Language Agents
https://arxiv.org/pdf/2404.18231

Personalization of Agents - Digital Persona



Role-Playing
– Adapt to Environment –
You are an engineer. Precision and attention to detail define your work, ensuring that ......
You are a judge who embodies fairness and impartiality, ensuring ......
You are a painter. You find beauty in everyday scenes, ...
You are a nurse. Your extensive medical knowledge and technical skills allow you ......
You are a benevolent King who rules with compassion and wisdom. You lead the ......
LLM
Personalization
– Adapt to User –
Please take {user info.} into consideration and respond to the question: {Q.}
"Brian Balmages" — Beathoven
"I will always love you" — Whitney Houston
"We will rock you" — Queen
46Y
18Y
25Y
Q: Please recommend a song that matches my current mood.



Make an accurate diagnosis.
Doctor
Patient
Medical Application
Create a snake game.
Coder
CTO
PM
CEO
Software Development
You are {Persona/Role}. You are tasked to {Given Task} under {Defined Env.}.
Role-Playing
– Adapt to Environment –
Choose a better response.
General Public
Critic
Psychologist
LLM as Evaluators
Explore the Minecraft world.
Assistant
Game
Give me some advices to improve my health. (18Y / 75 kg / 1.60 M)
Your BMI is 29.3, putting you at risk of overweight...
Healthcare
Give me some links for chocolate cookies recipes.
• AllRecipes: ... [Link]
• Food Network: ... [Link]
Search
Here is my watching history {...}. Recommend me three movies.
1. La La Land
2. Groundhog Day ...
Recommendation
LLM
Personalization
– Adapt to User –
Book a flight from Taipei to New York
When would you like to travel?
May 28 to June 10.
Sure. How many people?
Dialogue
Teach me the concept of black hole.
What do you know about black holes?
They are regions in space where ...
Correct. Additionally, ...
Education

Two Tales of Persona in LLMs: A Survey of Role-Playing and Personalization
https://arxiv.org/pdf/2406.01171

Personalization of Agents - Digital Persona

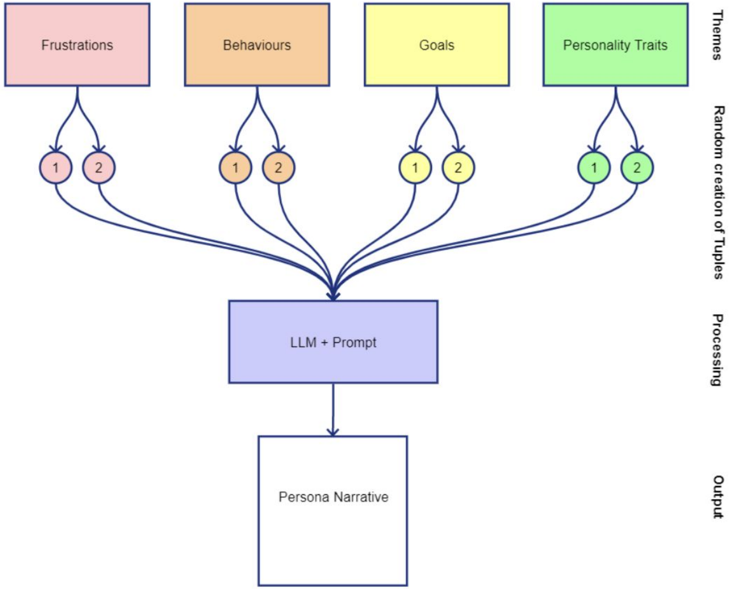
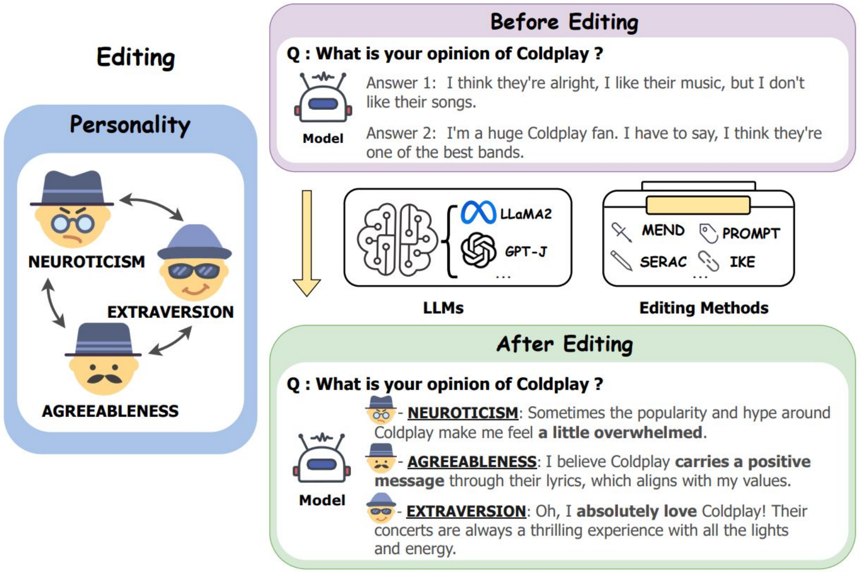


Figure 4 – Workflow used for the generation of Personas, using the Themes

Improved prompting and process for writing user personas with LLMs, using qualitative interviews
https://arxiv.org/pdf/2310.06391

Personalization of Agents - Digital Persona



Editing

Personality

NEUROTICISM

EXTRAVERSION

AGREEABLENESS

Before Editing

Q : What is your opinion of Coldplay ?

Model

Answer 1: I think they're alright, I like their music, but I don't like their songs.

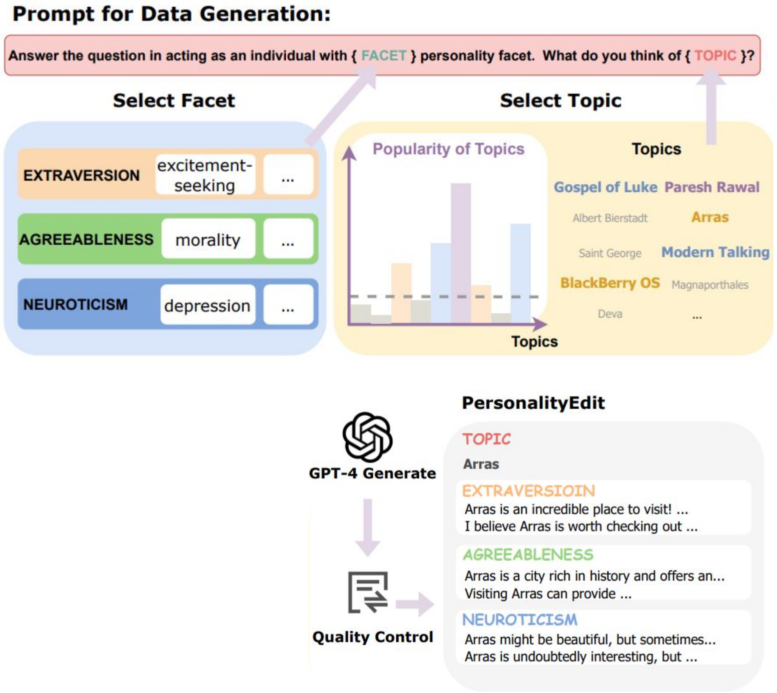
Answer 2: I'm a huge Coldplay fan. I have to say, I think they're one of the best bands.

After Editing

Q : What is your opinion of Coldplay ?

Model

- **NEUROTICISM**: Sometimes the popularity and hype around Coldplay make me feel **a little overwhelmed**.
- **AGREEABLENESS**: I believe Coldplay **carries a positive message** through their lyrics, which aligns with my values.
- **EXTRAVERSION**: Oh, I **absolutely love** Coldplay! Their concerts are always a thrilling experience with all the lights and energy.



Prompt for Data Generation:

Answer the question in acting as an individual with { FACET } personality facet. What do you think of { TOPIC }?

Select Facet

EXTRAVERSION	excitement-seeking	...
AGREEABLENESS	morality	...
NEUROTICISM	depression	...

Select Topic

PersonalityEdit

TOPIC

Arras

EXTRAVERSIOIN

Arras is an incredible place to visit! ...
I believe Arras is worth checking out ...

AGREEABLENESS

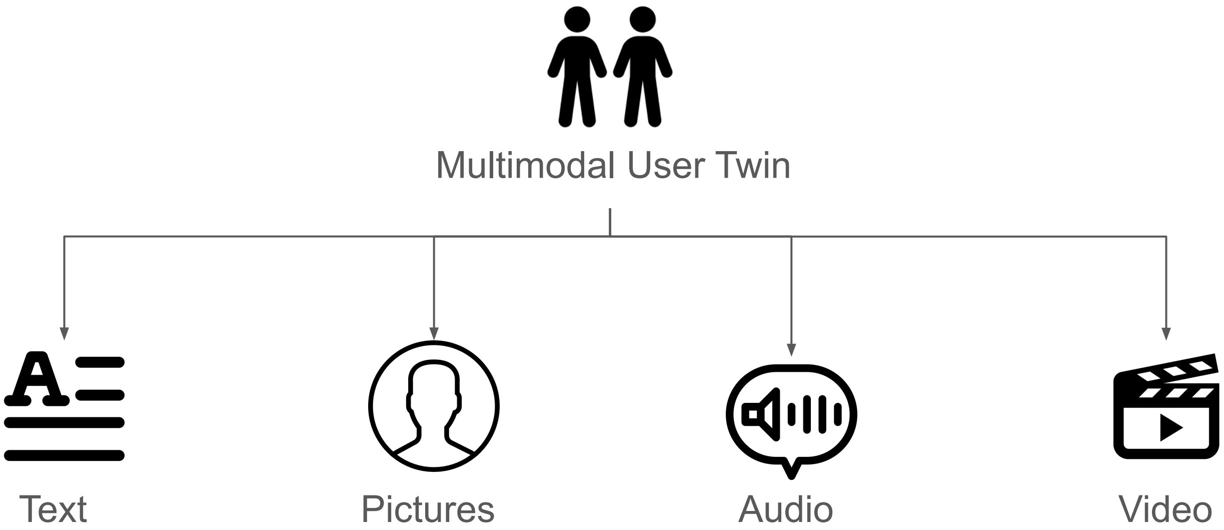
Arras is a city rich in history and offers an...
Visiting Arras can provide ...

NEUROTICISM

Arras might be beautiful, but sometimes...
Arras is undoubtedly interesting, but ...

Editing Personality For Large Language Models
https://arxiv.org/pdf/2310.02168

Personalization of Agents - Digital Human



Multimodal User Twin

Text

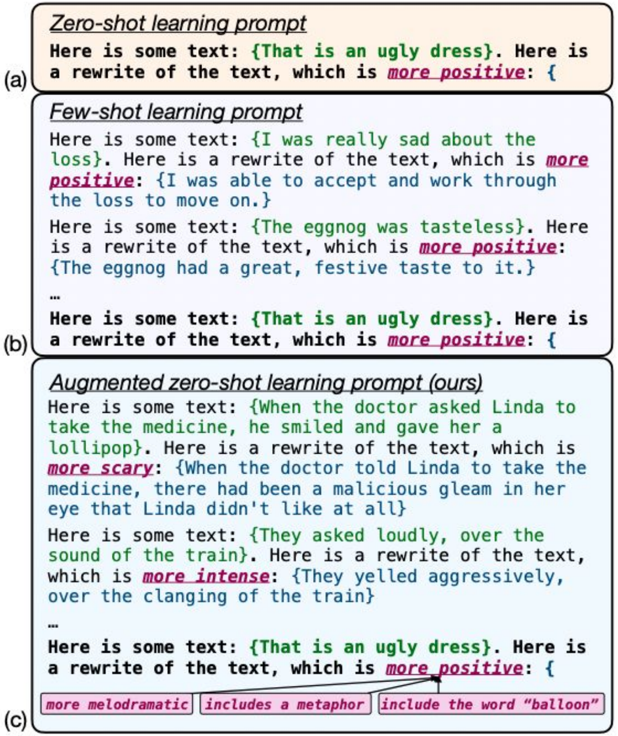
Pictures

Audio

Video

Personalization of Agents - Digital Human - Text

1.



(a)

Zero-shot learning prompt

Here is some text: {That is an ugly dress}. Here is a rewrite of the text, which is *more positive*: {

(b)

Few-shot learning prompt

Here is some text: {I was really sad about the loss}. Here is a rewrite of the text, which is ***more positive***: {I was able to accept and work through the loss to move on.}

Here is some text: {The eggnog was tasteless}. Here is a rewrite of the text, which is ***more positive***: {The eggnog had a great, festive taste to it.}

…

Here is some text: {That is an ugly dress}. Here is a rewrite of the text, which is *more positive*: {

(c)

Augmented zero-shot learning prompt (ours)

Here is some text: {When the doctor asked Linda to take the medicine, he smiled and gave her a lollipop}. Here is a rewrite of the text, which is ***more scary***: {When the doctor told Linda to take the medicine, there had been a malicious gleam in her eye that Linda didn't like at all}

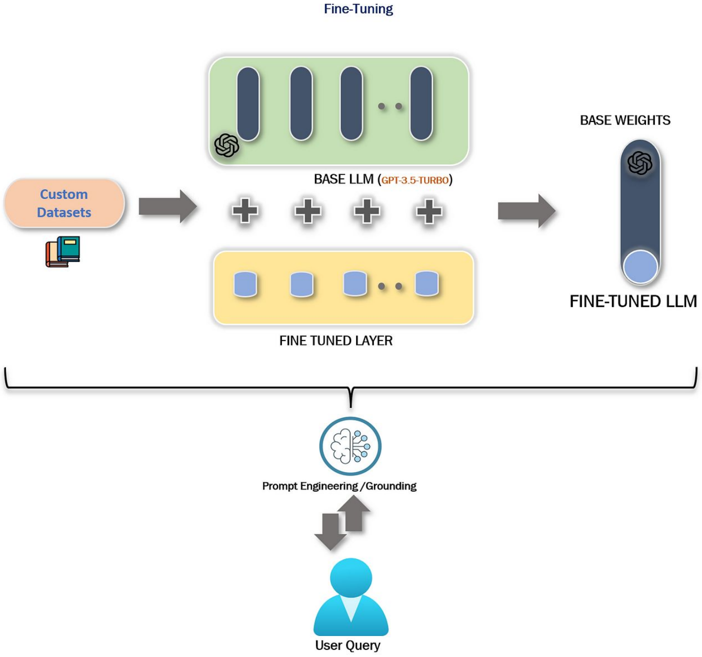
Here is some text: {They asked loudly, over the sound of the train}. Here is a rewrite of the text, which is ***more intense***: {They yelled aggressively, over the clanging of the train}

…

Here is some text: {That is an ugly dress}. Here is a rewrite of the text, which is *more positive*: {

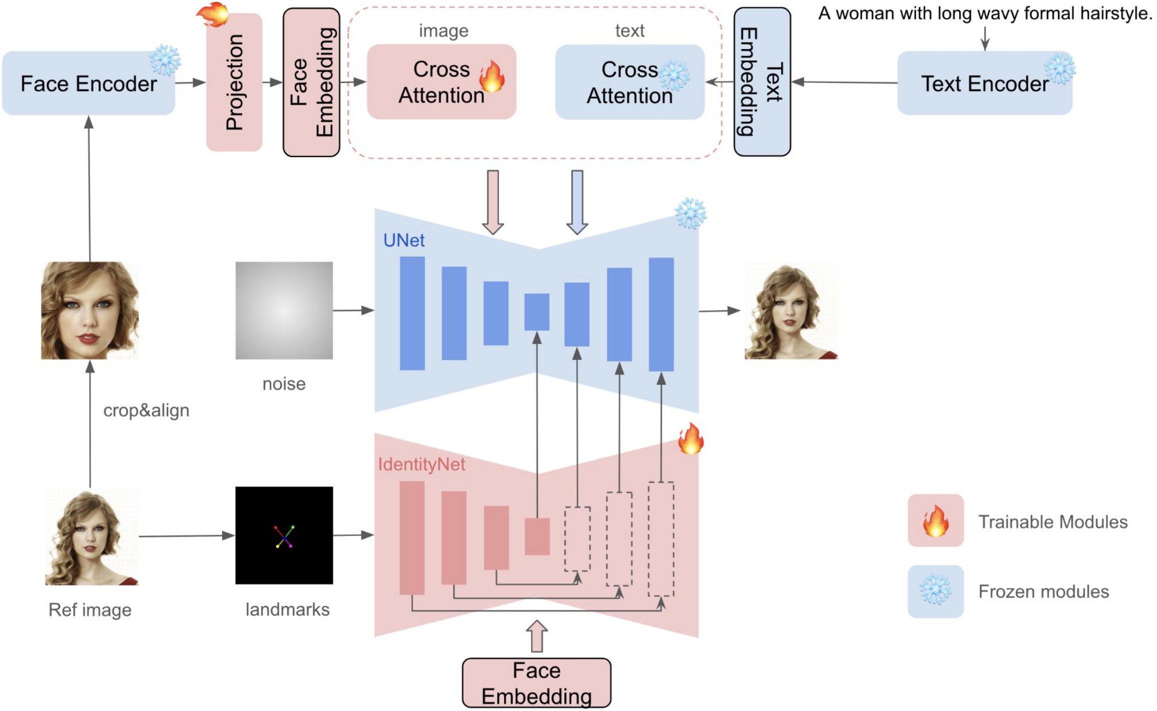
more melodramatic | *includes a metaphor* | *include the word "balloon"*

2. Fine-tuning



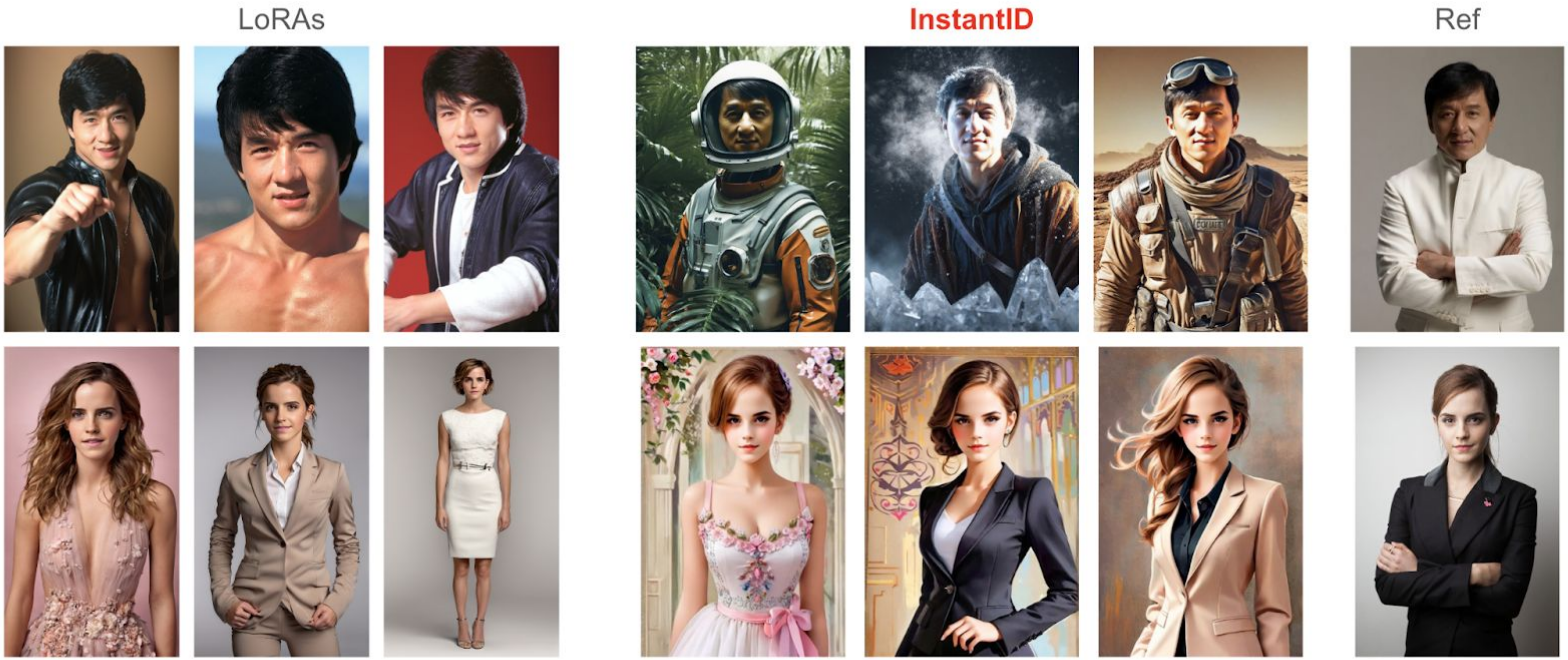
A Recipe For Arbitrary Text Style Transfer with Large Language Models
https://arxiv.org/pdf/2109.03910

Personalization of Agents - Digital Human - Pictures



InstantID: Zero-shot Identity-Preserving Generation in Seconds
https://arxiv.org/pdf/2401.07519

Personalization of Agents - Digital Human - Pictures



LoRA: 5+ pictures, 20+ minutes

InstantID: 1 picture, 13 seconds

InstantID: Zero-shot Identity-Preserving Generation in Seconds
https://arxiv.org/pdf/2401.07519

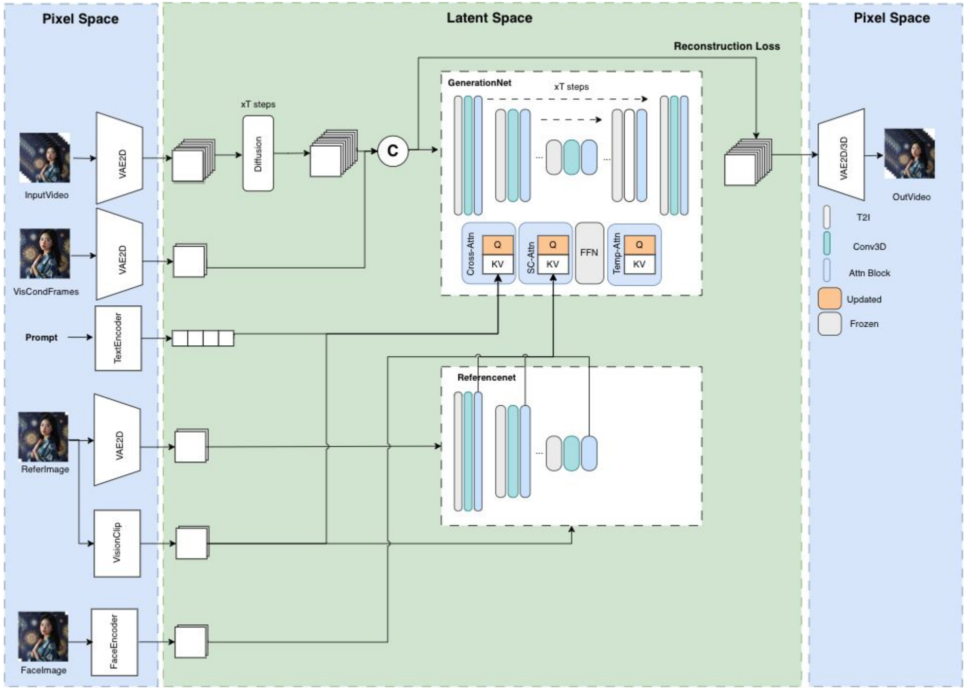
Personalization of Agents - Digital Human - Audio

coqui TTS

- Supports 17 languages
- Voice cloning from a 6-second audio clip
- Emotion and style transfer during cloning
- Voice cloning in multiple languages
- Sampling rate of 24 kHz

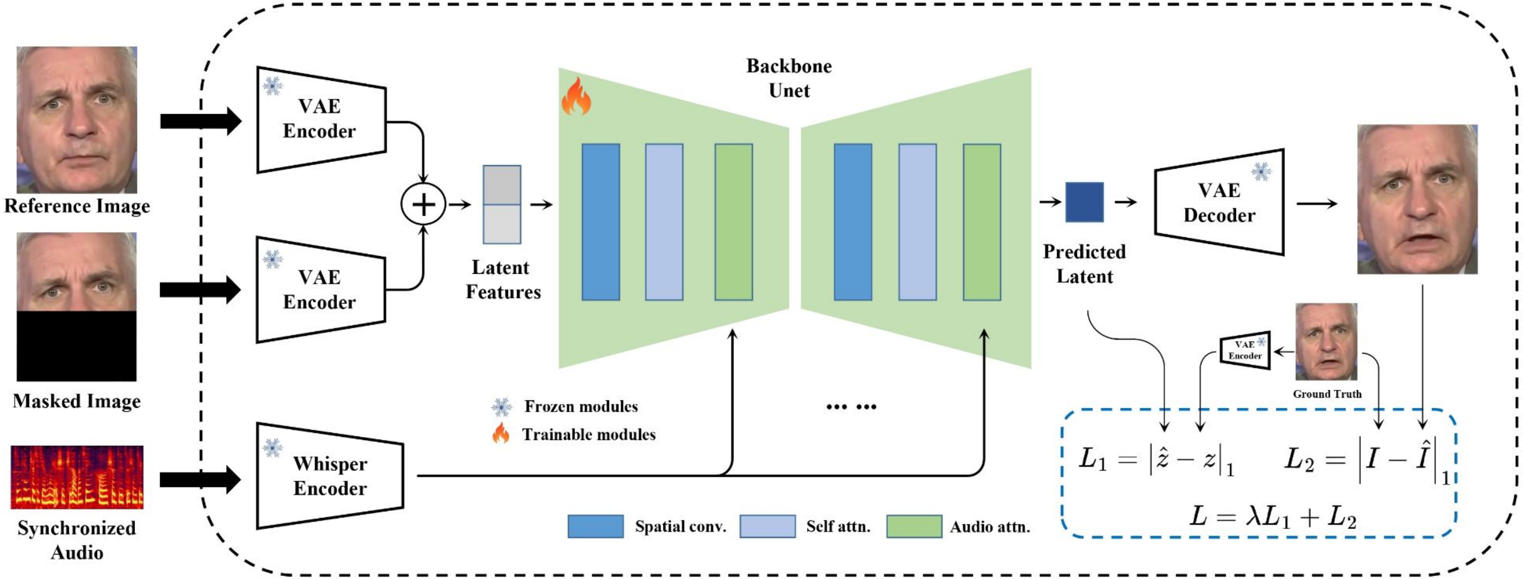
Deep learning toolkit for Text-to-Speech, battle-tested in research and production
https://github.com/coqui-ai/TTS

Personalization of Agents - Digital Human - Video



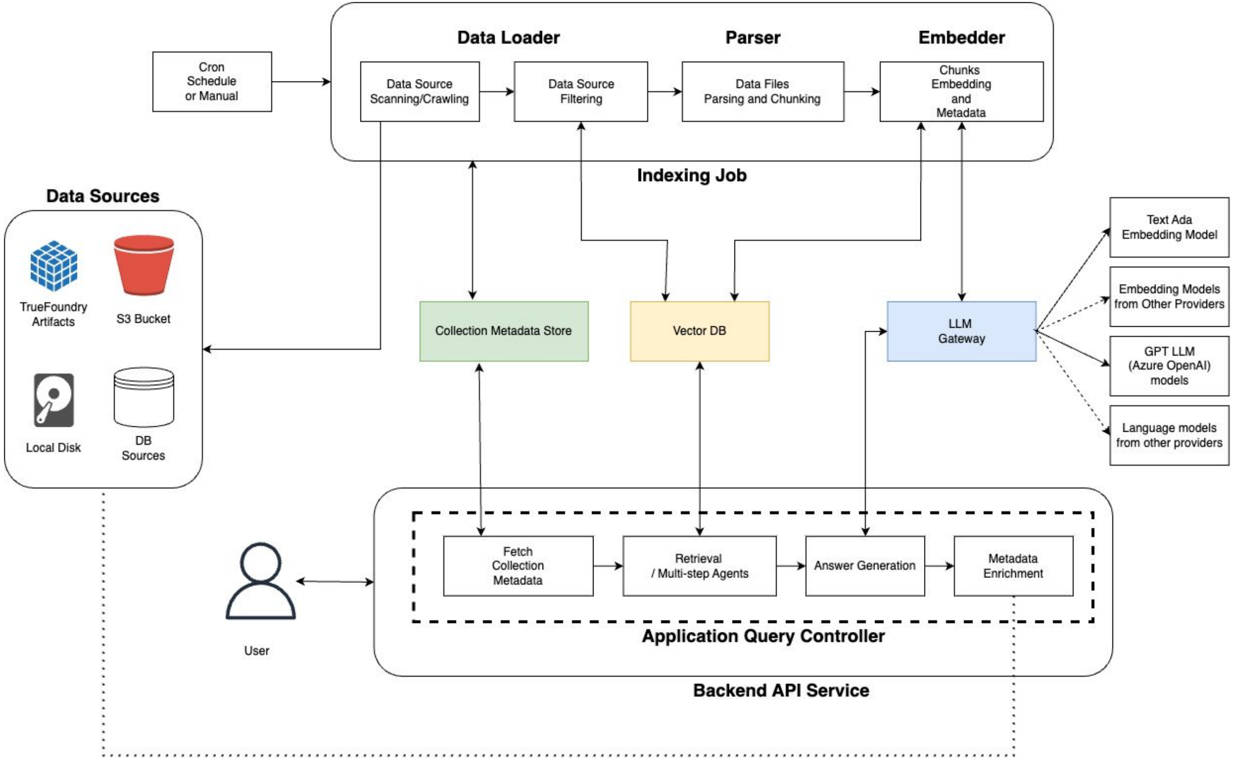
MuseV: Infinite-length and High Fidelity Virtual Human Video Generation with Visual Conditioned Parallel Denoising
https://tmelyralab.github.io/MuseV_Page/

Personalization of Agents - Digital Human - Talking head



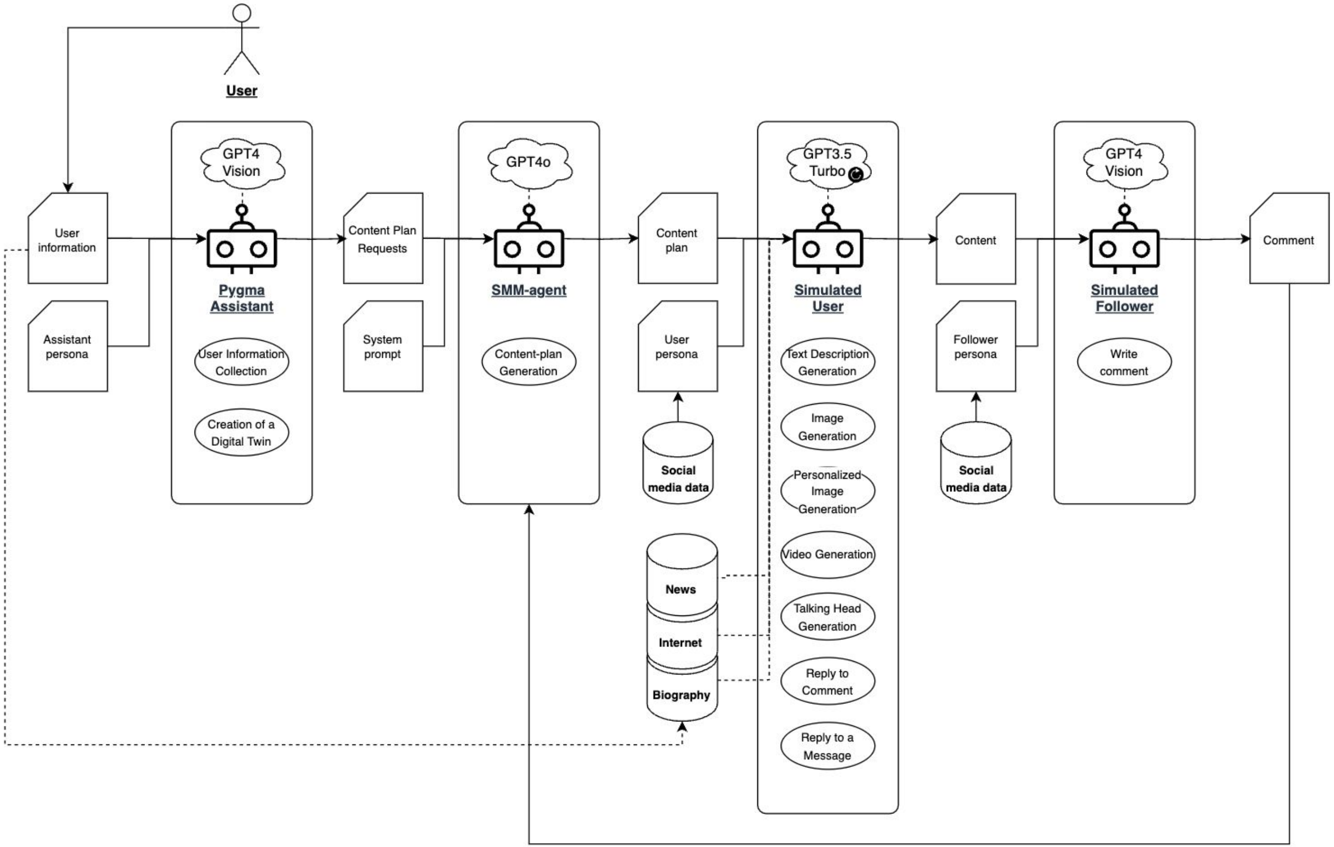
MuseTalk: Real-Time High Quality Lip Synchronization with Latent Space Inpainting
https://github.com/TMElyralab/MuseTalk

Personalization of Agents - Digital Self - Knowledge


Cron Schedule or Manual
Data Loader
Parser
Embedder
Data Source Scanning/Crawling
Data Source Filtering
Data Files Parsing and Chunking
Chunks Embedding and Metadata
Indexing Job
Data Sources
TrueFoundry Artifacts
S3 Bucket
Local Disk
DB Sources
Collection Metadata Store
Vector DB
LLM Gateway
Text Ada Embedding Model
Embedding Models from Other Providers
GPT LLM (Azure OpenAI) models
Language models from other providers
User
Fetch Collection Metadata
Retrieval / Multi-step Agents
Answer Generation
Metadata Enrichment
Application Query Controller
Backend API Service

RAG (Retrieval Augmented Generation) Framework for building modular, open source applications for production
https://github.com/truefoundry/cognita

Architecture of an Agent for Social Media



Product results

Product of the day 1st

Product of the week 1st

Product of the month 5th

pygma.me

andre.technology

Thank you!

@andre_dataist