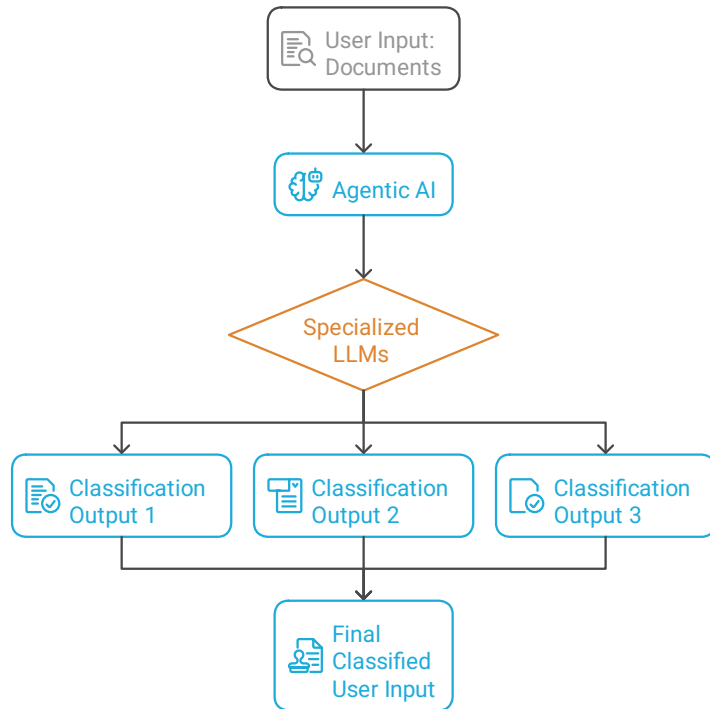




Document Processing with Agentic AI



Text Classification using LLMs for SAP Fiori AI Generation

Presenter: Danyal Aslam

Supervisor: Yuchen Xia

Examiner: Prof. Dr. Ing. Michael Weyrich



Introduction

Idea

"The application will list all buildings.",LIST_REPORT_BUILDINGS
"Upon selecting a building, it will display its details, tenants, leases maintenance lists.",OBJECT_PAGE_BUILDINGS
"When navigating to maintenance records linked to a building, it will show details of maintenance activities, assigned teams, and invoices used.",OBJECT_PAGE_MAINTENANCEACTIVITIES
"The user can also track lease record, they are navigated to the lease page, where they can view the list of tenants under the lease records, and utilities linked to the lease.",OBJECT_PAGE_UTILITIES
"The building details page will feature multiple tabs of information, such as general building details, facility information, and location details.",OBJECT_PAGE_BUILDINGS
"Additionally, it will include details about energy efficiency certifications, and historical occupancy data.",OBJECT_PAGE_BUILDINGS
"You can view and manage maintenance activities associated with a building.",OBJECT_PAGE_BUILDINGS X OBJECT_PAGE_MAINTENANCEACTIVITIES
"Buildings have multiple maintenance teams and inventory storage areas.",OBJECT_PAGE_MAINTENANCEACTIVITIES
"The application will provide a list of buildings with filters for:" ,LIST_REPORT_BUILDINGS
"o Building type",LIST_REPORT_BUILDINGS
"o Building status",LIST_REPORT_BUILDINGS
"o Location",LIST_REPORT_BUILDINGS

Agentic AI

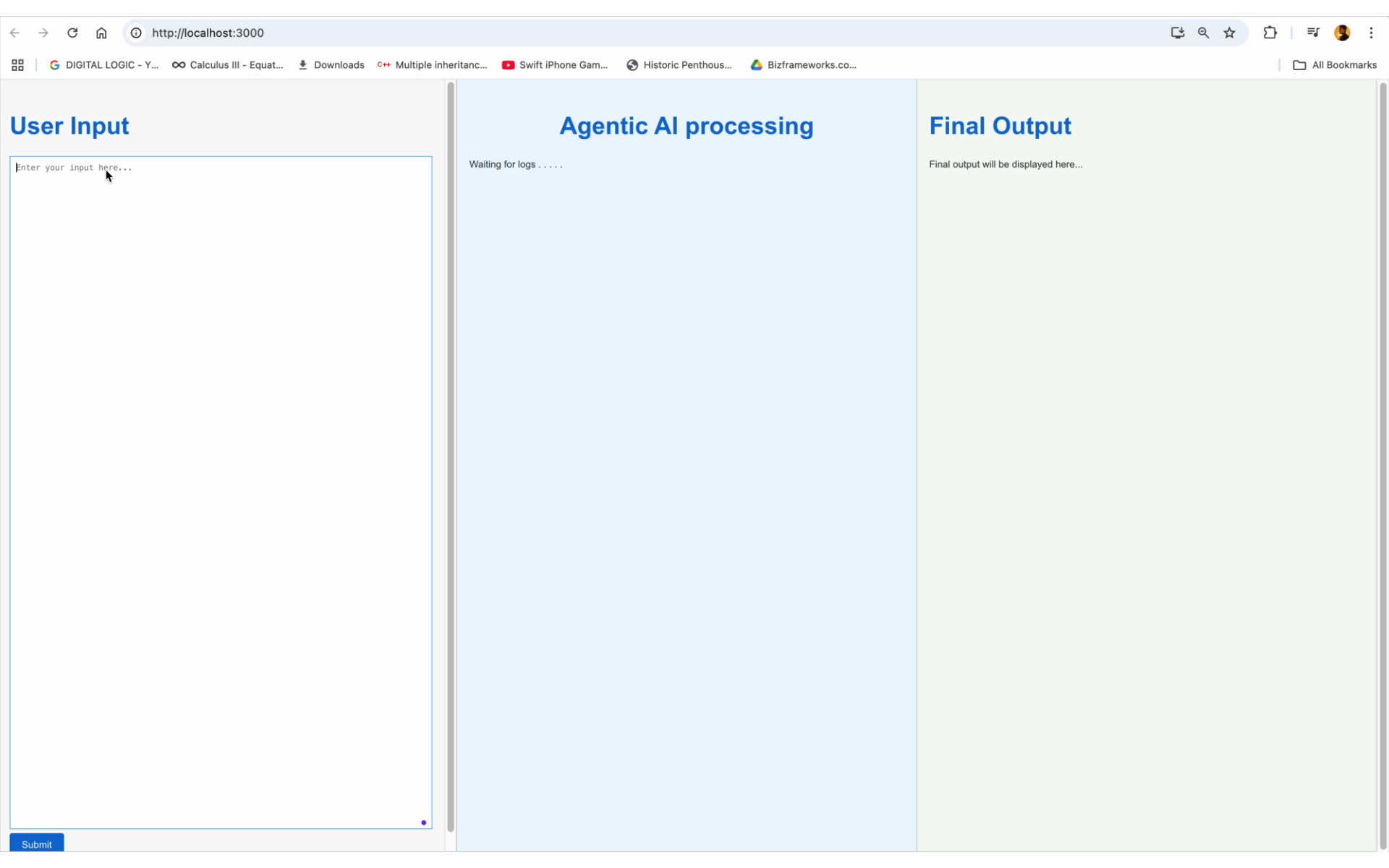
```
{
  "loadDataOnAppLaunch": "Enabled",
  "tables": [
    {
      "title": "Buildings List",
      "id": "buildingsList",
      "baseEntityType": "Buildings",
      "columns": [
        "buildingID",
        "buildingName",
        "address",
        "buildingType",
        "buildingStatus",
        "constructionDate",
        "lastRenovationDate",
        "size",
        "numberOfFloors",
        "energyEfficiencyRating",
        "complianceCertifications",
        "historicalOccupancyData"
      ]
    }
  ],
  "filters": [
    "buildingType",
    "buildingStatus",
    "address",
    "constructionDate",
    "lastRenovationDate"
  ]
}
```

JSON Model

Introduction

Problem

- Traditional methods for classifying user requirements into Fiori templates are **manual, time-consuming, and error-prone**.
- Engineers must interpret large documents to extract relevant software features, leading to inconsistency and high effort. Engineers must **interpret large documents** to extract relevant software features, leading to inconsistency and high effort.
- There is a strong need to **automate and accurately classify** this information into technical entities (e.g., UI components, services).
- The proposed solution uses **Large Language Models (LLMs)** to extract structured data and enable **automated software generation**.
- LLMs can ensure “**no more, no less, necessary inference**”, improving accuracy, recall, and productivity through an LLM-agent-based pipeline.



User Input

Enter your input here...

Submit

Agentic AI processing

Waiting for logs

Final Output

Final output will be displayed here...

Introduction

Problem Statement

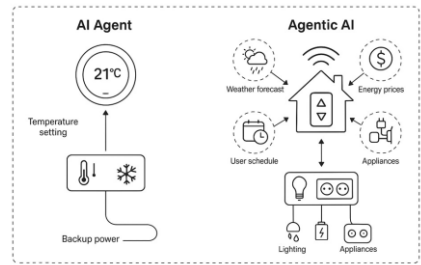
Entity	Description
LIST_REPORT_BUILDINGS	Lists all buildings in an SAP Fiori List Report page.
OBJECT_PAGE_BUILDINGS	Detail pages describing a building including tenants, leases, maintenance activities
OBJECT_PAGE_MAINTENANCEACTIVITIES	Detail of maintenance activities, maintenance teams, & inventory items
OBJECT_PAGE_LEASES	Lease-specific object page detailing tenant, payment & utilities
NONE	Lines not directly relating to any above entities

- The application will list all buildings.
- Upon selecting a building, it will display its details, including associated tenants, leases, maintenance lists.
- When navigating to maintenance records linked to a building, users can view maintenance activity details, teams, and inventory items.
- The user can track lease records, viewing tenants, rents, and associated utilities.
- Users can click maintenance team or inventory items for further detail

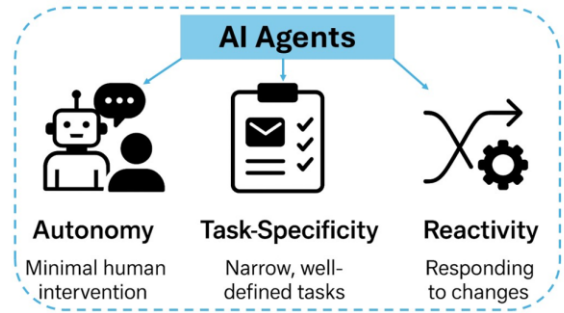
Basics

Background

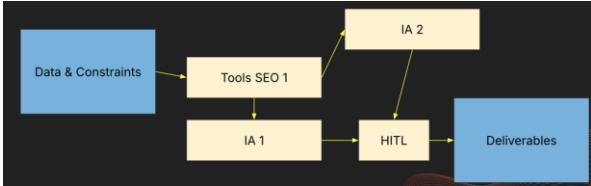
Literature Review



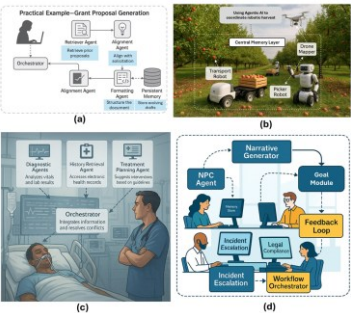
AI Agents vs. Agentic AI: A Conceptual Taxonomy, Applications, and Challenges [1]



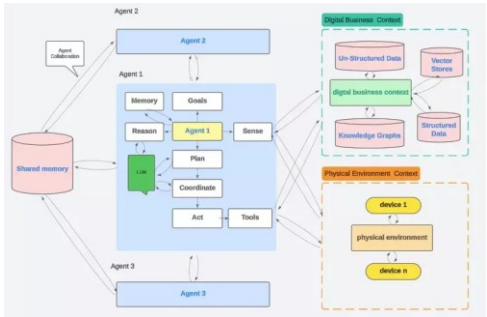
Agentic AI: Autonomous Intelligence for Complex Goals – A Comprehensive Survey [2]



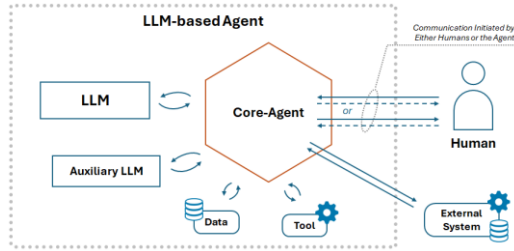
Agentic AI Optimisation (AAIO): What It Is, How It Works, Why It Matters, and How to Deal with It [3]



An Agentic System with Reinforcement-Learned Improvements for Parsing Form-Like Documents [4]



Agentic AI: Emerging Paradigm (Survey) [5]



LLM-Agent-UMF: LLM-based Agent Unified Modeling Framework [6]

Agentic AI: Methods and Theories

- Theoretical Foundations
 - Agentic AI for text classification leverages specialized LLM agents that autonomously interact with task-specific knowledge and environment data.
- Multi-Agent Collaboration:
 - Multiple LLM agents work together, each focusing on sub-tasks like context understanding, data pre-processing, and final decision-making.
- Task Decomposition:
 - Tasks are decomposed into specialized roles (e.g., data cleaning agent, classification agent, evaluation agent), improving performance and interpretability.
- Iterative Reasoning:
 - Agents iteratively refine predictions through feedback loops, enhancing classification accuracy and adaptability.

Key References

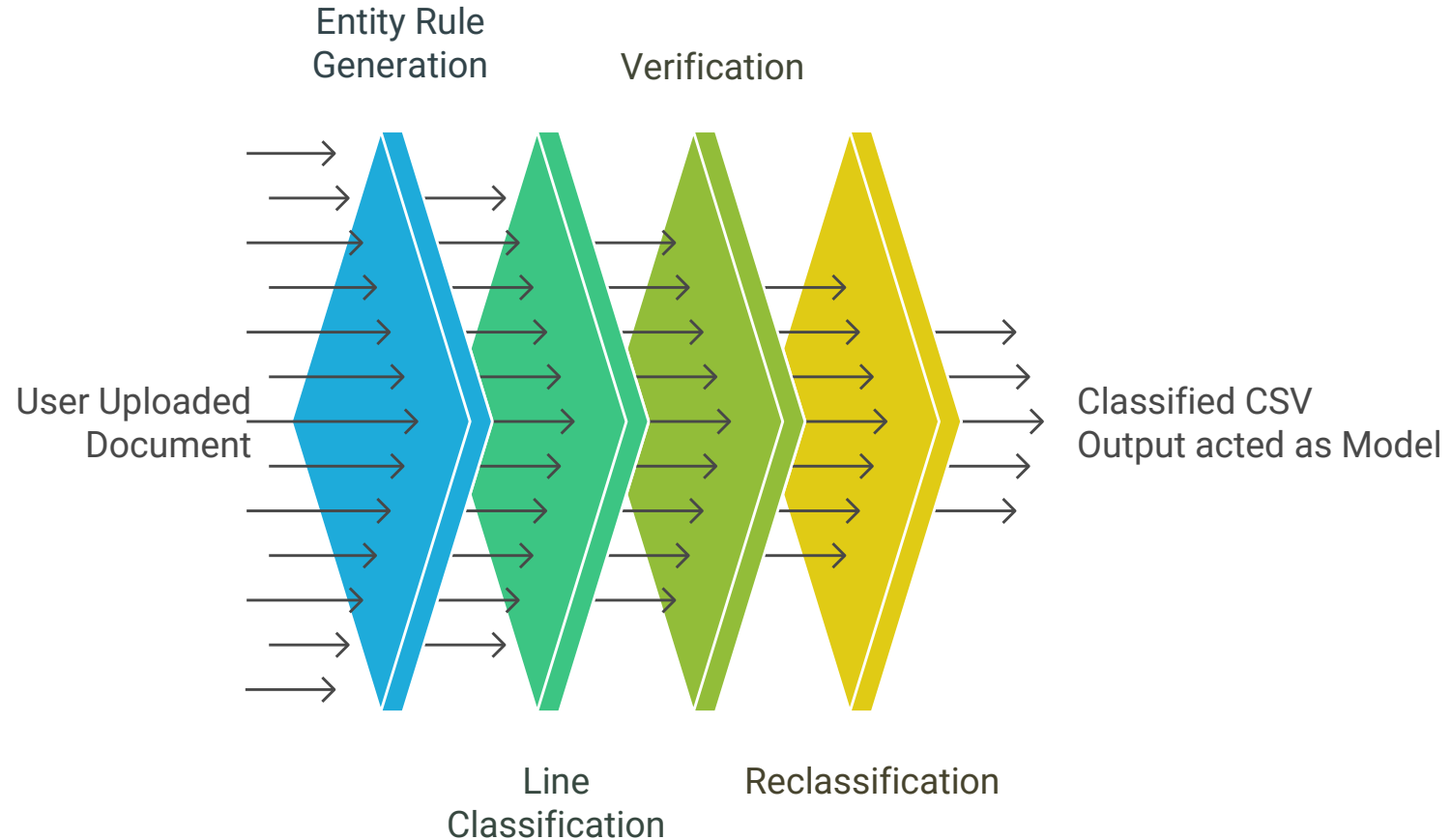
Agentic AI in Text Classification: Smith et al., 2023 (arxiv.org/abs/2304.00001)

LLM-Driven Classification Pipeline: Brown et al., 2023 (arxiv.org/abs/2302.00001)

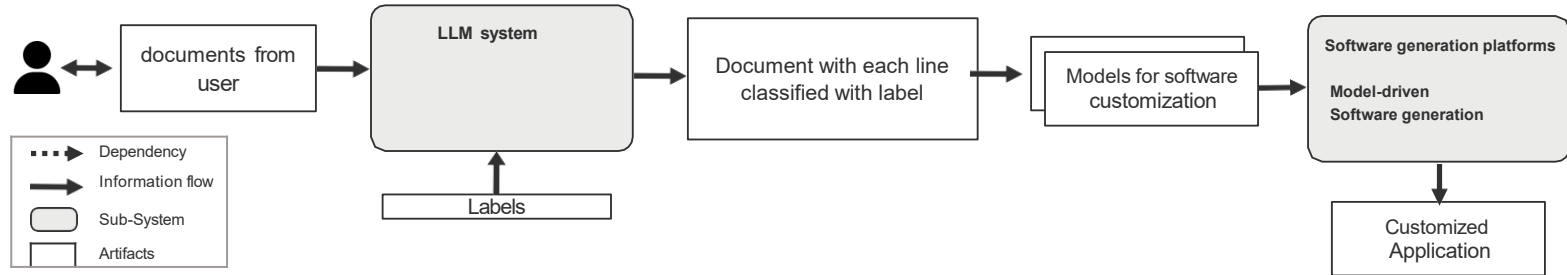
System Design

System Design

Information Processing Pipeline



Classification Problem (1/2)

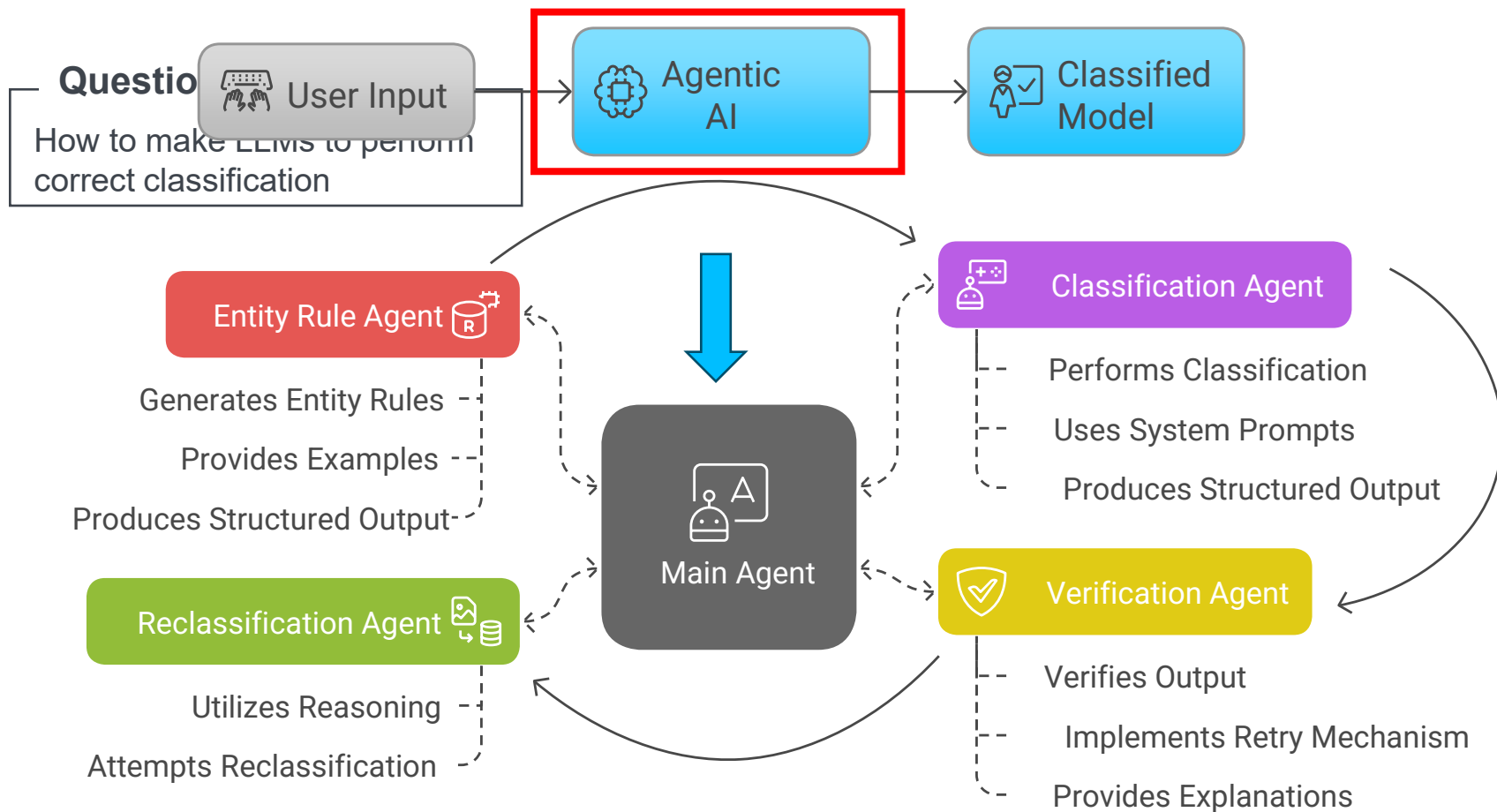


Classification Problem (2/2)

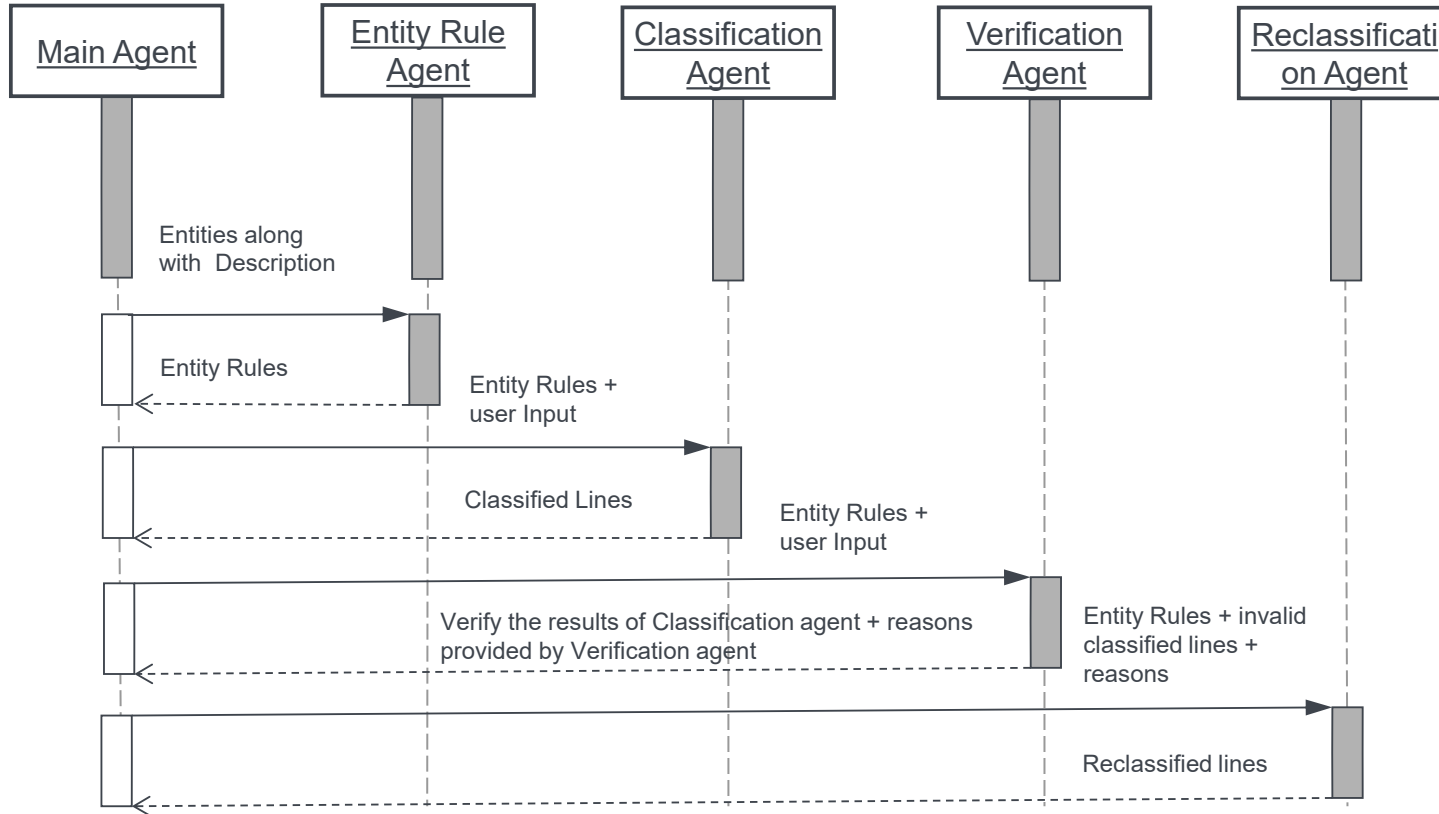
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- The application will list all buildings.
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- Users can click maintenance team or inventory items for further detail

Agent Design



Agentic AI Architecture



Data Set

Requirement Documents Scenarios

Component Type	Page Count	Description
Complex + Long	6 pages	Highest difficulty →
Complex + Short	4 pages	Moderate difficulty →
Complex + Short	2 pages	Low difficulty →
Long (Hallucination Edge Case)	4 pages	Low difficulty, clearly structured →
Short (Baseline)	1 pages	Simple, used as baseline →
Well-defined + Long	7 pages	Moderate difficulty, clearly structured →

App Structure

The app is structured as follows: You start with a list of sales orders. When you create a new sales order or when you change or display a single sales order from the list, you first get to see the sales order header (that is, data that is relevant for the entire sales order). At the top of the screen, you can easily check the most important data, such as the sold-to party or the net value. You can find more detailed information, for example, prices or the process flow, on dedicated tabs.

The list of items gives you an overview of all items in the sales order. You can choose a single item to display more detailed information. Again, you can see some key data for this item, such as the requested quantity, at the top of the screen. Dedicated tabs contain more detailed information, such as delivery details or schedule lines.

Creating Sales Orders

You can create a sales order with reference to a sales contract or a sales quotation or without reference documents.

To create a sales order without reference documents with this app, you have various options:

- You can use the default option for creating a sales order in the list of this app.
- You can use the **Create Sales Orders** tile on the SAP Fiori launchpad.

Result and Evaluation

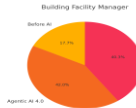
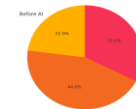
- **Model generation quality**
- LLM benchmark in classification

Good Results vs. Bad Results

Line Content	Entity Provided by LLM
The application will list all buildings.	OBJECT_PAGE_BUILDINGS ❌
Upon selecting a building, it will display its details, including associated tenants, leases, maintenance lists.	NONE ❌
When navigating to maintenance records linked to a building, users can view maintenance activity details, teams, and inventory items.	NONE ❌
The user can track lease records, viewing tenants, rents, and associated utilities.	NONE ❌
NONE	Lines not directly relating to any above entities

Line Content	Correct Entity
The application will list all buildings.	LIST_REPORT_BUILDINGS ✔️
Upon selecting a building, it will display its details, including associated tenants, leases, maintenance lists.	OBJECT_PAGE_BUILDINGS ✔️
When navigating to maintenance records linked to a building, users can view maintenance activity details, teams, and inventory items.	OBJECT_PAGE_MAINTENANCEACTIVITIES ✔️
The user can track lease records, viewing tenants, rents, and associated utilities.	OBJECT_PAGE_LEASES ✔️

Key Observations

Scenario	Before AI (%)	AI 4.0 (%)	AI 3.5 (%)	Pie Chart								
Building Facility Manager	36.60	86.96	83.33	 <table><tr><th>Category</th><th>Percentage</th></tr><tr><td>Before AI</td><td>36.60%</td></tr><tr><td>AI 3.5</td><td>83.33%</td></tr><tr><td>AI 4.0</td><td>86.96%</td></tr></table>	Category	Percentage	Before AI	36.60%	AI 3.5	83.33%	AI 4.0	86.96%
Category	Percentage											
Before AI	36.60%											
AI 3.5	83.33%											
AI 4.0	86.96%											
Requirement Document Scenario	50.45	98.21	71.77	 <table><tr><th>Category</th><th>Percentage</th></tr><tr><td>Before AI</td><td>50.45%</td></tr><tr><td>AI 3.5</td><td>71.77%</td></tr><tr><td>AI 4.0</td><td>98.21%</td></tr></table>	Category	Percentage	Before AI	50.45%	AI 3.5	71.77%	AI 4.0	98.21%
Category	Percentage											
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AI 4.0	98.21%											
Equipment Management Conversion	33.70	96.46	72.73	 <table><tr><th>Category</th><th>Percentage</th></tr><tr><td>Before AI</td><td>33.70%</td></tr><tr><td>AI 3.5</td><td>72.73%</td></tr><tr><td>AI 4.0</td><td>96.46%</td></tr></table>	Category	Percentage	Before AI	33.70%	AI 3.5	72.73%	AI 4.0	96.46%
Category	Percentage											
Before AI	33.70%											
AI 3.5	72.73%											
AI 4.0	96.46%											
Customer Contract Management	40.74	81.48	70.37	 <table><tr><th>Category</th><th>Percentage</th></tr><tr><td>Before AI</td><td>40.74%</td></tr><tr><td>AI 3.5</td><td>70.37%</td></tr><tr><td>AI 4.0</td><td>81.48%</td></tr></table>	Category	Percentage	Before AI	40.74%	AI 3.5	70.37%	AI 4.0	81.48%
Category	Percentage											
Before AI	40.74%											
AI 3.5	70.37%											
AI 4.0	81.48%											
Manage Sales Order Fiori Launchpad	68.42	84.62	76.27	 <table><tr><th>Category</th><th>Percentage</th></tr><tr><td>Before AI</td><td>68.42%</td></tr><tr><td>AI 3.5</td><td>76.27%</td></tr><tr><td>AI 4.0</td><td>84.62%</td></tr></table>	Category	Percentage	Before AI	68.42%	AI 3.5	76.27%	AI 4.0	84.62%
Category	Percentage											
Before AI	68.42%											
AI 3.5	76.27%											
AI 4.0	84.62%											

Result analysis

Without Agenti Design

Standard

Editing Status: Type: Status: Location: Construction Date: Renovation Date:

Search [All] [Go] Adapt Filters (1)

Buildings (5) Tenants (5) Leases (7) Maintenance Activities (5)

Building Id	Name	Type	Status	Location	Construction Date	Renovation Date
B004	Apartment Complex	Residential	Active	Houston	12 Sept 2012	10 Jul 2021
B002	Office Building	Commercial	Active	Los Angeles	10 Jun 2005	20 Sept 2018
B003	Warehouse	Industrial	Inactive	Chicago	25 Mar 1998	30 Nov 2015
B005	Retail Store	Commercial	Active	Miami	20 Nov 2017	5 Dec 2020
B001	Residential Tower	Residential	Active	New York	1 Jan 2020	15 May 2022

Create Delete

7 table
fields

Standard

Editing Status: Building Type: Building Status: Address: Construction Date: Last Renovation Date:

Search [All] [Go] Adapt Filters (1)

Buildings (5)

Building ID	Building Name	Address	Building Type	Building Status	Construction Date	Last Renovation D...	Size	Number Of Floors	Energy Efficiency Rating
B001	Sunset Apartments	123 Sunset Blvd, Springfield	Residential	Occupied	15 Jun 2005	10 Aug 2020	1,500.75	10	A+
B002	Downtown Office Complex	456 Main St, Springfield	Commercial	Under maintenance	20 Nov 1998	22 May 2018	3,000.5	15	B
B005	Tech Park Tower	654 Innovation Dr, Springfield	Commercial	Under maintenance	10 Dec 2000	30 Nov 2017	4,500.25	20	B+
B003	Greenwood Mall	789 Market Ave, Springfield	Commercial	Occupied	30 Mar 2010	15 Jan 2021	5,000	3	A
B004	Riverside Condos	321 River Rd, Springfield	Residential	Occupied	25 Jul 2012	5 Sept 2019	2,000	8	A-

Create Delete

10 table
fields

Result analysis

Without Agent Design

← → ↺ 🏠

http://localhost:4004/contractmanager/webapp/index.html

🔍 ☆ 🗂️ ⬇️ 👤 ⋮

DIGITAL LOGIC - Y...

Calculus III - Equat...

Downloads

Multiple inheritanc...

Swift iPhone Gam...

Historic Penthous...

Bizframeworks.co...

All Bookmarks

Standard ▾

🔗 ↕

Editing Status: ID:

Search 🔍 All

Go Adapt Filters (1)

Enter

Customer Contract Equipment

Customers

Create Delete 🛠️ ⚙️ 📄 | ▾

☐ ID	Name	Address	Contact Info
To start, set the relevant filters and choose "Go".			

☐	Customer ID	Name	Address	Contact Information	
☐	CUST001	John Doe	123 Elm Street, Springfield	johndoe@example.com	>
☐	CUST005	Tech Solutions	202 Birch Boulevard, Central City	support@techsolutions.com	>
☐	CUST002	Jane Smith	456 Oak Avenue, Metropolis	janesmith@example.com	>
☐	CUST004	Global Industries	101 Maple Lane, Star City	info@globalindustries.com	>
☐	CUST003	Acme Corp	789 Pine Road, Gotham	contact@acmecorp.com	>

Result analysis

With Agentic AI
(verification agent 4.0)

B001				
General Information				
Building ID	Building Status	Last Renovation Date	Compliance Certifications	Equipment Origin
B001	Occupied	10 Jan 2020	LEED Gold	USA
Building Name	Location	Size	Historical Occupancy Data	Warranty Details
Sunset Apartments	Downtown	1,500.75	80% occupancy in last 5 years	5-year warranty on elevators
Address	Construction Date	Number Of Floors	Facility Specifications	Inventory Storage Areas
123 Sunset Blvd, Springfield	15 May 2018	18	Central HVAC, Fire alarms	Basement storage
Building Type	Energy Efficiency	Equipment Overview	Maintenance History	
Residential	A+	Elevators, Generators	Regular HVAC maintenance	
Tenants (2)				
Tenant ID	Tenant Name	Contact Information	Tenant Type	Lease Details
T005	Emily Johnson	emj@example.com	Individual	Lease for apartment 303
T001	John Doe	jdoe@example.com	Individual	Lease for apartment 101
Leases (2)				
Lease ID	Lease Start Date	Lease End Date	Lease Terms	Spaces Covered
L001	1 Jan 2021	31 Dec 2023	No pets allowed	Apartment 101
L005	1 May 2023	30 Apr 2026	No subletting	Apartment 303
Maintenance Activities (1)				
Activity ID	Activity Description	Activity Date	Assigned Team	Inventory Used
M001	HVAC system check	15 Jan 2023	Team A	Filters, Tools
Maintenance Teams (1)				
Team ID	Team Name	Team Specialization	Maintenance Activity	
MT001	Team A	HVAC systems	M001	

With Agentic AI
(verification agent 3.5)

http://localhost:4004/buildingmanager/webapp/index.html?app=ui-xx-viewCacheName=Buildings(Dr-2)dateId=9001-40a3-67bf-67f4c27ac93aActiveView=010

Key Observations

Scenario	Without Agentic AI (%)	With Agentic AI 4.0 (%)	With Agentic AI 3.5 (%)
Building Facility Manager	36.60	86.96	83.33
Requirement Document Scenario	50.45	98.21	71.77
Equipment Management Conversion	33.70	96.46	72.73
Customer Contract Management	40.74	81.48	70.37
Manage Sales Order Fiori Launchpad	68.42	84.62	76.27

Result and Evaluation

- Model generation quality
- **LLM benchmark in classification**

Performance Comparison Across Different Models

Model	Context Window	Accuracy Rank	Token Price	Suitability
Deepseek_V3	128k	 1st	 Low	 Best Fit
Llama 3.3 70B	2048	 2nd	 Low	 Limited Context
Gemini 1.0 Pro	33k	 1st	 High	 Costly
GPT-4o	16k	 2nd	 High	 Costly
GPT-3.5 Turbo	4096	 3rd	 Medium	 Small Context

Evaluation of Requirement Documents Using Various Models

Requirement Document	Size of requirement document	 1st	 2nd	 3rd
BFM	3 pages	Deepseek_V3	Gemini 1.0	Llama 3.3
CCM	2 pages	Deepseek_V3	Gemini 1.0	Llama 3.3
EMC	5 pages	Deepseek_V3	Llama 3.3	Gemini 1.0
MSO	4 pages	Deepseek_V3	Gemini 1.0	Llama 3.3
RDS	6 pages	Deepseek_V3	Gemini 1.0	Llama 3.3

Key Observations

Metric	Deepseek_V3	Llama 3.3	Gemini 1.0	GPT-4o	GPT-3.5
Context Fit	✅ good context window	⚠️ Limited context window	⚠️ Limited context window	✅ good context window	⚠️ Limited
Accuracy	🏆 1 High	🥈 2 Good	🏆 1 High	🥈 2 Good	🥉 3 Average
Cost	💰 Low	💰 Low	💵 High	💵 Very High	💰 Medium

Conclusion	✅ Best	Could be improved	Not Unsuitable	Not Unsuitable	Could be improved
------------	--------	-------------------	----------------	----------------	-------------------

Findings and Outlook

Findings and Outlook

- Achievement:

- Classification accuracy improved

- Agentic AI architecture :

- **36.6%→86.96%↑,**
- **50.45%→98.21%↑,**

- Supervised fine-tuning (SFT) and in-context learning :

- experiments enhanced the model's knowledge generalization, enabling accurate classification on unseen patterns.

- Cost :

(~€182), demonstrating that significant accuracy gains can be achieved with relatively low investment.

- Token-efficiency :

Using the 16K-token context window allowed richer prompts with more examples/rules, improving input scalability without proportional cost increase.

Findings and Outlook

- Outlooks:
 - **Scaling up:** Apply the agentic classification pipeline to larger datasets and additional SAP Fiori modules to validate generalizability and robustness.
 - **Domain-specific tuning:** Incorporate more domain data (e.g. specialized requirement docs) for fine-tuning to further boost accuracy on niche tasks.
 - **Cost optimization:** Explore model/compute optimizations (e.g. distillation, prompt engineering, cheaper models) to improve cost-effectiveness of deployment and fine-tuning.
 - **Agentic refinement:** Leverage the multi-agent (agentic) AI design iteratively – adding more verifier/feedback agents and automated rule generation – for continuous learning and self-improvement of the system.



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Thank you!



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