



# AgLLM: Enhancing Agriculture with LLM-Driven Data Curation and Verifiable Recommendations

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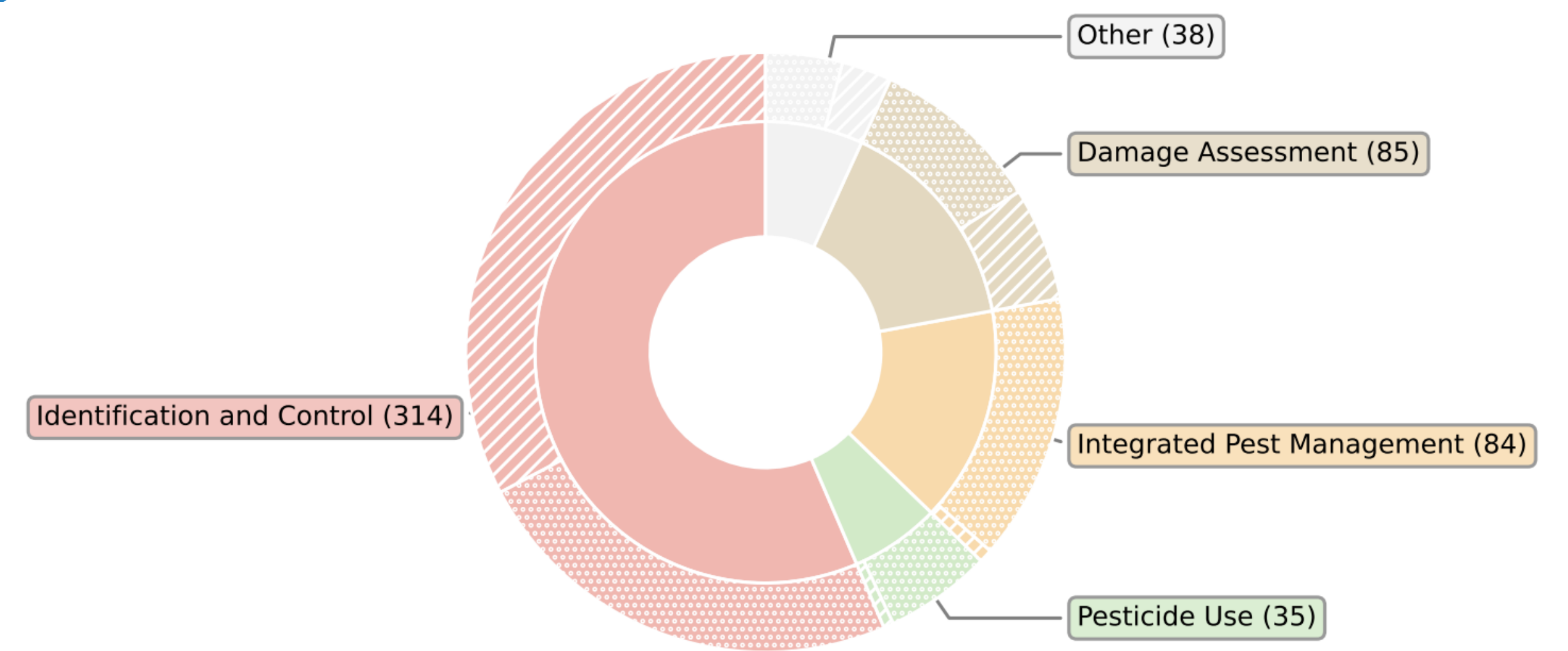
## Motivation

### Purpose

- Consolidate fragmented agricultural insect/weed data
- Provide verifiable recommendations for improved pest management

### Data Sources

- Expert-verified data on 90 species (49 insects, 41 weeds)
- Documents from University Extension Programs



(a) Insect Categories

## Methodology

### Knowledge Base Construction:

- Academic literature and curated internet resources

### Retrieval Augmented Generation (RAG) System:

- Document pre-processing, indexing, and metadata-based filtering

### Conversational Interface:

- ConversationalRetrievalChain (Langchain) with Gradio UI

### Multi-LLM Support:

- GPT-4, GPT-3.5, Claude 3 Opus, Llama-3, Gemini-1.5 Pro
- Synthetic question-answer pair generation for Evaluation

Are Aphis Glycines dangerous ?

Answer:

Yes, Aphis glycines, also known as soybean aphids, can cause significant injury and economic loss to soybean crops if left untreated, leading to discolored or wilted plants and reduced yields.

Source:

Iowa State University Extension and Outreach. "Field Crop Insects." Iowa State University Extension Store, June 26, 2023. <https://store.extension.iastate.edu/product/13725>. Information about aphis glycines.

Domain: Select Domain (Insects)

Species: Select the Species (aphis glycines)

User prompt: Please add user prompt here

LLM: Select the LLM (Llama-3 70B)

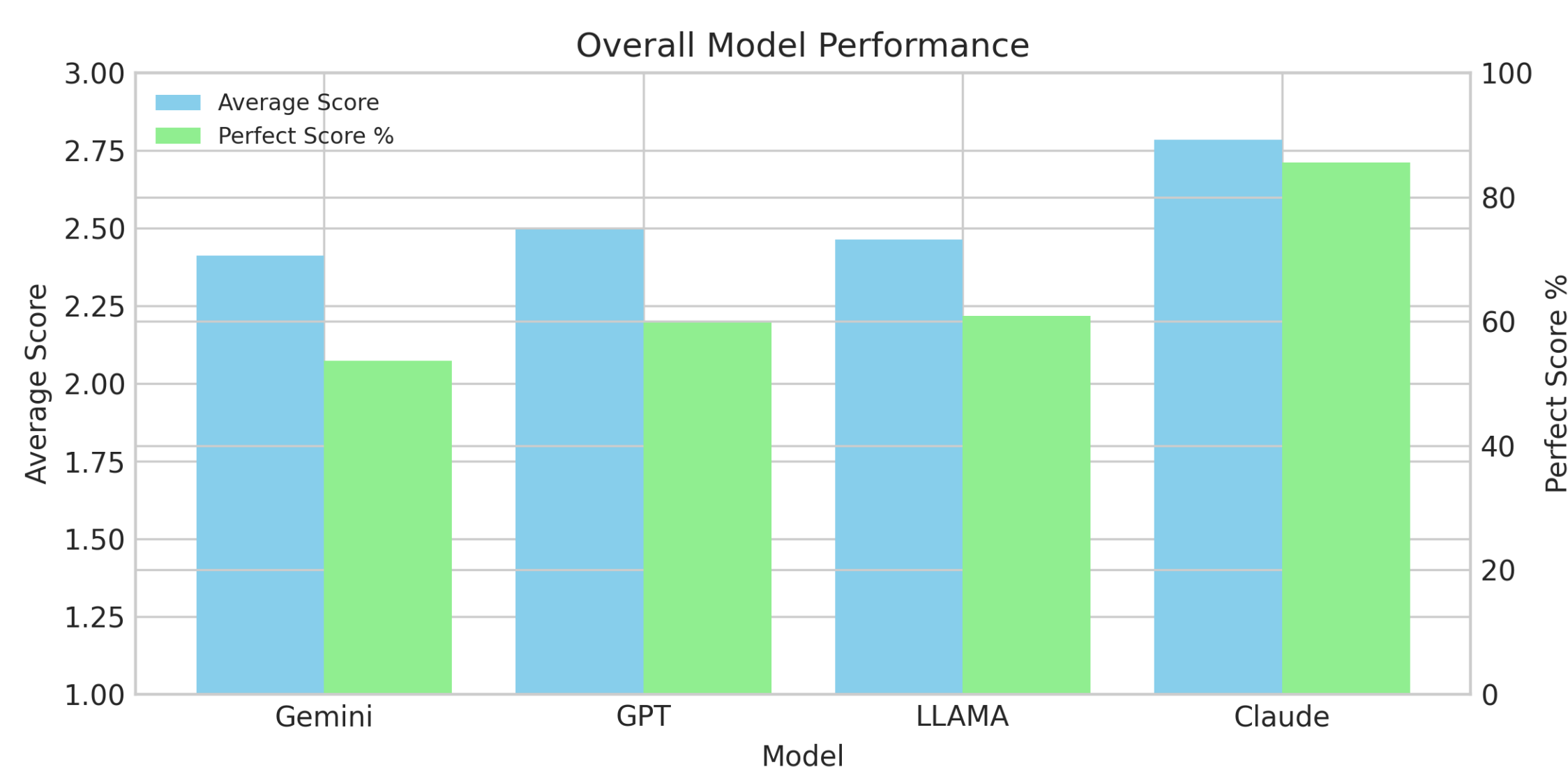
Mode: Select the Mode (Researcher)

Submit

Toggle to use Retrieval-Augmented Generation: ☒ Use RAG

## Results

- Expert assessment of LLM outputs



- RAG pipeline evaluation:

Recall of 82% (at n=3) and Precision 65% (at n=1)

## Conclusion

- Developed RAG system with high recall (82% at n=3) and precision (65% at n=1)
- Implemented user-type aware responses for farmers and researchers
- Bridged gap between scattered information and practical pest management needs



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