

Chapter 3: AI for Literature Review and Research

Chapter 3: AI for Literature Review and Research

- Presentation of tools such as Elicit, Scopus AI and Web of Science Research Assistant
- Writing intelligent search queries
- Automatic summarization of scientific articles
- Critical evaluation of AI-recommended sources

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❖ 3. 1. Introduction: Why Use AI in Scientific Research?

Scientific production is growing rapidly:

- ⦿ Millions of articles are published every year
- ⦿ Thousands of scientific journals exist
- ⦿ Fields like AI, cybersecurity, energy, and healthcare evolve quickly

A student or researcher cannot:

- ⦿ Read everything
- ⦿ Identify the most relevant work easily
- ⦿ Compare dozens of papers efficiently

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❖ 3. 1. Introduction: Why Use AI in Scientific Research?

- ⦿ Artificial Intelligence acts as an intelligent research assistant.

However:

- AI accelerates research, but it does **NOT** replace **human** scientific reasoning.

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❖ 3.2. AI Tools for Literature Review

Modern AI research tools combine:

- ⦿ Natural Language Processing (NLP)
- ⦿ Semantic search
- ⦿ Citation analysis
- ⦿ Automatic summarization
- ⦿ Trend detection

3.2.1 Elicit

Elicit is an AI-powered research assistant that allows users to:

- ⦿ Ask scientific questions in natural language
- ⦿ Retrieve relevant academic papers
- ⦿ Automatically extract key information
- ⦿ Compare methodologies across papers

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❖ 3.2. AI Tools for Literature Review

3.2.1 Elicit

The screenshot displays the Elicit website interface. At the top, the browser address bar shows "elicit.com". The navigation bar includes the Elicit logo, "Recents", "Library", and "Alerts" links, along with an "Upgrade" button and a "Help" dropdown menu.

The main content area is divided into two sections:

- Popular workflows:** A list of workflow options including "Research report" (selected), "Systematic review" (marked PRO), and "Agents" (marked BETA). Under "Agents", there are "Competitive landscape" and "General research agent" (both marked PRO).
- Tools:** A list of tool options including "Find papers", "Paper chat", and "Extract data" (marked PRO).

The main content area also features a large text input field with the prompt: "Ask a research question to generate a structured research report automatically". Below this, there is a section for examples with the text: "Try a couple of free examples to see what this is all about". Three example prompts are provided: "GLP-1R mechanisms", "Magnesium effects on sleep", and "Online vs. in-person CBT". At the bottom of the main content area, there is a dropdown menu labeled "Source Research papers" and a blue arrow button to submit the query.

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❖ 3.2. AI Tools for Literature Review

3.2.1 Elicit

Example Question: *“What deep learning models are commonly used for load forecasting?”*

The system will:

1. Analyze the question
2. Search academic databases
3. Retrieve relevant papers
4. Extract:
 - Research objective
 - Methodology
 - Dataset
 - Results
 - Limitations

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❖ 3.2. AI Tools for Literature Review

3.2.1 Elicit

Advantages

- ⦿ Saves time
- ⦿ Structured comparison
- ⦿ Helpful for systematic reviews

Limitations

- ⦿ May miss important recent studies
- ⦿ Summaries may be incomplete
- ⦿ Depends on indexed data quality

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❖ 3.2. AI Tools for Literature Review

❖ 3.2 .2 Scopus AI

Description

- Scopus AI is integrated into the Scopus database, which includes:
- Peer-reviewed journals
- Conference proceedings
- Indexed academic publications

Advanced Features

- Concept-based search (not only keyword matching)
- Citation analysis
- Identification of influential authors
- Trend visualization

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❖ 3.2. AI Tools for Literature Review

❖ 3.2 .2 Scopus AI

- Educational Example
- *Search:*
 - smart grid stability deep learning
- *Scopus AI can:*
 - Rank papers by citation count
 - Identify leading researchers
 - Show research evolution over time

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❖ 3.2. AI Tools for Literature Review

❖ 3. 2.3 Web of Science Research Assistant

- Web of Science is a historical and highly reputable academic database.

Its AI assistant allows:

- Automatic keyword suggestions
- Citation network analysis
- Research impact measurement
- Detection of emerging research fields

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❖ 3.2. AI Tools for Literature Review

❖ 3. 2.3 Web of Science Research Assistant

Important Concept: Citation Network

- If paper A cites paper B, and B cites C,
- We can build a **scientific citation graph** that shows:
 - Foundational research
 - Influential publications
 - Evolution of ideas

3.3. Writing Intelligent Search Queries

- A good literature review starts with a well-structured query.

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❖ 3.3. Writing Intelligent Search Queries

- A good literature review starts with a well-structured query.

3.1 The Problem with Simple Queries

Example: AI energy

- Problems:
 - **Too broad**
 - **Too many irrelevant results**
 - **Poor academic precision**

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❖ 3.3. Writing Intelligent Search Queries

3.2 Structure of a Scientific Query

- **An effective query includes:**
- **Research domain**
- **Method or technique**
- **Application**
- **Synonyms**

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❖ 3.3. Writing Intelligent Search Queries

3.3 Boolean Operators

- Boolean operators help refine or expand search results in scientific queries. The main operators are: **AND**, **OR**, **NOT**.

3.3.1. AND – Intersection (narrows results)

- Finds results containing **all keywords**.
- **Example:**
- AI **AND** medicine
- Articles must mention **both AI and medicine**.

3.3.2. OR – Union (broadens results)

- Finds results containing **any of the keywords** (synonyms).

Example:

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❖ 3.3. Writing Intelligent Search Queries

3.3 Boolean Operators

Example:

- AI **OR** "Artificial Intelligence"

Articles containing AI, or Artificial Intelligence, or both.

3.3.3. NOT – Exclude

- Removes unwanted topics.
- Example: AI **NOT** robotics

Articles about AI but not robotics.

Combined Example

- ("Artificial Intelligence" OR AI) AND Education NOT Robotics
- Finds AI articles about Education, excluding Robotics.
- topics

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❖ 3.3. Writing Intelligent Search Queries

3.3 Boolean Operators

3.4 Advanced Query Example

Example : ("machine learning" OR "deep learning") **AND** ("load forecasting" **OR** "energy prediction") **AND** ("smart grid")

NOT review

This returns:

- *Experimental papers*
- *Precise and relevant results*
- *Excludes survey articles*

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❖ 3.3. Writing Intelligent Search Queries

3.3 Boolean Operators

3.5 Key Student Skill

Example : Transforming a research idea into a logical query.

Idea: Neural networks for electrical load prediction

Structured query: ("neural network" **OR** "LSTM") **AND**
("electrical load forecasting")

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❖ 3. 4. Automatic Summarization of Scientific Articles

Scientific papers typically include:

- 1) *Introduction*
- 2) *Related Work*
- 3) *Methodology*
- 4) *Results*
- 5) *Discussion*
- 6) *Conclusion*

- AI can generate summaries to speed up reading.

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❖ 3. 4. Automatic Summarization of Scientific Articles

3.4.1 Extractive Summarization

- Selects key sentences directly from the paper.

Advantages: Faithful to original text

Disadvantages: May lack coherence

3.4.2 Abstractive Summarization

- Generates a new summary using its own wording.

Advantages: More readable

Disadvantages: Risk of misinterpretation

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❖ 3. 4. Automatic Summarization of Scientific Articles

3.4.3 Recommended Academic Method

- *Read AI summary*
- *Read introduction*
- *Analyze figures and tables*
- *Read conclusion*
- *Identify the real contribution*

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❖ 3.5. Critical Evaluation of AI-Recommended Sources

- This is the most important skill.

3.5.1 Risks

- *Non-existent articles (hallucinations)*
- *Misinterpretation*
- *Non-indexed journals*
- *Predatory journals*
- *Outdated sources*

3.5.2 Scientific Evaluation Criteria

- 1) Journal Quality : **Is it indexed? Is it peer-reviewed?**
- 2) Citation Count : **More citations often indicate higher influence.**

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❖ 3.5. Critical Evaluation of AI-Recommended Sources

3.5.2 Scientific Evaluation Criteria

3.Methodology Quality

- Real dataset?
- Clear evaluation metrics?
- Fair comparison with existing methods?

4.Reproducibility

- Is code available?
- Is dataset accessible?

5.Relevance

- Does it directly answer the research question?