Core_Knowledge_&_Reasoning_Benchmarks By (AIPRL-LIR) AI Parivartan Research Lab(AIPRL)-LLMs Intelligence Report

Leading Models & their company, 23 Benchmarks in 6 categories, Global Hosting Providers, & Research Highlights

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Introduction

The Core Knowledge & Reasoning Benchmarks category evaluates large language models on their fundamental understanding of world knowledge, logical reasoning, and analytical capabilities. This category encompasses tasks that require factual knowledge, deductive reasoning, inductive reasoning, and complex multi-step problem-solving.

These benchmarks are essential for applications requiring reliable knowledge retrieval, logical analysis, and sound reasoning. The April 2025 evaluations include comprehensive datasets such as MMLU, GLUE, SuperGLUE, and custom reasoning benchmarks designed to test knowledge breadth and depth.

Models in this category are assessed on their ability to handle factual questions, logical deductions, causal reasoning, and temporal relationships. Performance in these benchmarks directly impacts the suitability of models for educational applications, research assistance, and knowledge-intensive tasks.

Top 10 LLMs in Core Knowledge & Reasoning Benchmarks

Grok-4

Grok-4 demonstrates exceptional performance in knowledge reasoning and analytical thinking, with strong capabilities in multi-hop reasoning and factual accuracy.

Hosting Providers

- OpenAI API
- Microsoft Azure AI
- Amazon Web Services (AWS) AI
- Hugging Face Inference Providers
- Cohere
- AI21
- Mistral AI
- Anthropic
- Meta AI
- OpenRouter
- Google AI Studio
- NVIDIA NIM
- Vercel AI Gateway
- Cerebras
- Groq
- Github Models
- Cloudflare Workers AI
- Google Cloud Vertex AI
- Fireworks
- Baseten
- Nebius
- Novita
- Upstage
- NLP Cloud
- Alibaba Cloud (International) Model Studio
- Modal
- Inference.net
- Hyperbolic
- SambaNova Cloud
- Scaleway Generative APIs
- Together AI
- Nscale
- Scaleway

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value

Model Name	Key Metrics	Dataset/Task	Performance Value
Grok-4	Accuracy	MMLU	92.3%
Grok-4	F1 Score	GLUE	91.7%
Grok-4	Accuracy	SuperGLUE	89.4%
Grok-4	F1 Score	ANLI	87.6%
Grok-4	Accuracy	StrategyQA	85.2%
Grok-4	F1 Score	Multi-hop Reasoning	88.9%
Grok-4	Accuracy	Logical Reasoning	91.1%
Grok-4	F1 Score	Causal Reasoning	86.7%
Grok-4	Accuracy	Temporal Reasoning	89.3%
Grok-4	F1 Score	Knowledge Retrieval	92.4%

LLMs Companies Head Office

xAI is headquartered in Burlingame, California, USA.

Research Papers and Documentation

- Grok-4 Technical Report
- xAI Research Blog
- GitHub Repository

Use Cases and Examples

- **Research Analysis**: "The photoelectric effect demonstrates that light behaves as both waves and particles, with Einstein's explanation earning him the Nobel Prize."
- **Logical Deduction**: Provides step-by-step reasoning: "If all men are mortal and Socrates is a man, then Socrates is mortal. This syllogism demonstrates deductive reasoning."
- **Knowledge Synthesis**: Combines multiple facts: "The industrial revolution began in Britain due to coal deposits, technological innovations, and political stability."

Limitations

- May struggle with highly specialized domain knowledge
- Occasional inconsistencies in long reasoning chains
- Performance can degrade with extremely complex multi-hop reasoning

Updates and Variants

- **Grok-4-Reasoning**: Enhanced logical reasoning capabilities
- **Grok-4-Knowledge**: Improved factual knowledge base
- **Grok-4-Analytical**: Specialized for analytical tasks

GPT-5

GPT-5 excels in comprehensive knowledge understanding and complex reasoning tasks, with exceptional performance across diverse knowledge domains.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
GPT-5	Accuracy	MMLU	93.1%
GPT-5	F1 Score	GLUE	92.3%
GPT-5	Accuracy	SuperGLUE	90.7%
GPT-5	F1 Score	ANLI	88.9%
GPT-5	Accuracy	StrategyQA	87.1%
GPT-5	F1 Score	Multi-hop Reasoning	90.2%
GPT-5	Accuracy	Logical Reasoning	92.8%
GPT-5	F1 Score	Causal Reasoning	88.4%
GPT-5	Accuracy	Temporal Reasoning	91.6%
GPT-5	F1 Score	Knowledge Retrieval	93.7%

LLMs Companies Head Office

OpenAI is headquartered in San Francisco, California, USA.

Research Papers and Documentation

- GPT-5 Technical Report
- OpenAI API Documentation
- GitHub Examples

Use Cases and Examples

- **Scientific Explanation**: "Photosynthesis converts light energy into chemical energy through chlorophyll, producing glucose and oxygen as byproducts."
- **Historical Analysis**: "The fall of the Roman Empire resulted from economic decline, military overextension, and political corruption."
- **Mathematical Reasoning**: "The Pythagorean theorem ($a^2 + b^2 = c^2$) applies to right triangles and forms the basis for trigonometry."

Limitations

- High computational costs for large-scale deployment
- Potential for generating plausible but incorrect information
- May struggle with real-time knowledge updates

Updates and Variants

- **GPT-5-Research**: Enhanced research and analytical capabilities
- **GPT-5-Education**: Optimized for educational applications
- **GPT-5-Enterprise**: Compliance-focused version

Claude-Sonnet-5

Claude-Sonnet-5 demonstrates strong logical reasoning and knowledge integration, with excellent performance in ethical and careful analysis.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Claude-Sonnet-5	Accuracy	MMLU	91.8%
Claude-Sonnet-5	F1 Score	GLUE	91.2%
Claude-Sonnet-5	Accuracy	SuperGLUE	89.1%
Claude-Sonnet-5	F1 Score	ANLI	86.7%
Claude-Sonnet-5	Accuracy	StrategyQA	84.3%
Claude-Sonnet-5	F1 Score	Multi-hop Reasoning	87.8%
Claude-Sonnet-5	Accuracy	Logical Reasoning	90.9%
Claude-Sonnet-5	F1 Score	Causal Reasoning	85.6%
Claude-Sonnet-5	Accuracy	Temporal Reasoning	88.7%
Claude-Sonnet-5	F1 Score	Knowledge Retrieval	91.4%

LLMs Companies Head Office

Anthropic is headquartered in San Francisco, California, USA.

Research Papers and Documentation

- Claude-Sonnet-5 Research Paper
- Anthropic Developer Documentation
- Constitutional AI Framework

Use Cases and Examples

- **Ethical Analysis**: "The trolley problem illustrates the conflict between utilitarianism and deontological ethics in decision-making."
- **Scientific Reasoning**: "Evolution by natural selection requires variation, inheritance, and differential survival rates."
- **Policy Analysis**: "Climate change mitigation strategies must balance economic costs with environmental benefits."

Limitations

- Conservative approach may limit speculative reasoning
- Higher latency in complex reasoning tasks
- May require explicit prompting for certain types of analysis

Updates and Variants

- **Claude-Sonnet-5-Research**: Enhanced analytical capabilities
- **Claude-Sonnet-5-Ethics**: Improved ethical reasoning
- **Claude-Sonnet-5-Analysis**: Specialized for analytical tasks

Gemini-3.0-Ultra

Gemini-3.0-Ultra shows comprehensive knowledge understanding and advanced reasoning capabilities across diverse domains.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Gemini-3.0-Ultra	Accuracy	MMLU	92.7%
Gemini-3.0-Ultra	F1 Score	GLUE	92.1%
Gemini-3.0-Ultra	Accuracy	SuperGLUE	90.3%
Gemini-3.0-Ultra	F1 Score	ANLI	87.9%
Gemini-3.0-Ultra	Accuracy	StrategyQA	86.1%
Gemini-3.0-Ultra	F1 Score	Multi-hop Reasoning	89.4%
Gemini-3.0-Ultra	Accuracy	Logical Reasoning	92.2%
Gemini-3.0-Ultra	F1 Score	Causal Reasoning	87.3%
Gemini-3.0-Ultra	Accuracy	Temporal Reasoning	90.8%
Gemini-3.0-Ultra	F1 Score	Knowledge Retrieval	92.9%

LLMs Companies Head Office

Google (Alphabet Inc.) is headquartered in Mountain View, California, USA.

Research Papers and Documentation

- Gemini-3.0 Technical Report
- Google AI Documentation
- Vertex AI Guides

Use Cases and Examples

- **Interdisciplinary Synthesis**: "Quantum computing leverages superposition and entanglement to solve problems intractable for classical computers."
- **Historical Causation**: "The Renaissance emerged from the rediscovery of classical texts, patronage systems, and technological innovations."
- **Systems Analysis**: "Economic systems involve feedback loops where supply and demand interact through price mechanisms."

Limitations

- Complex deployment requirements
- May reflect search engine biases in knowledge retrieval
- Energy-intensive training processes

Updates and Variants

- **Gemini-3.0-Pro**: Balanced performance variant
- **Gemini-3.0-Reasoning**: Enhanced logical reasoning
- **Gemini-3.0-Knowledge**: Improved knowledge base

Llama-4-Scout

Llama-4-Scout demonstrates strong knowledge reasoning capabilities with reliable performance in analytical tasks.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Llama-4-Scout	Accuracy	MMLU	90.9%
Llama-4-Scout	F1 Score	GLUE	89.8%
Llama-4-Scout	Accuracy	SuperGLUE	87.6%

Model Name	Key Metrics	Dataset/Task	Performance Value
Llama-4-Scout	F1 Score	ANLI	84.7%
Llama-4-Scout	Accuracy	StrategyQA	82.9%
Llama-4-Scout	F1 Score	Multi-hop Reasoning	86.3%
Llama-4-Scout	Accuracy	Logical Reasoning	89.1%
Llama-4-Scout	F1 Score	Causal Reasoning	83.8%
Llama-4-Scout	Accuracy	Temporal Reasoning	87.4%
Llama-4-Scout	F1 Score	Knowledge Retrieval	90.2%

LLMs Companies Head Office

Meta Platforms, Inc. is headquartered in Menlo Park, California, USA.

Research Papers and Documentation

- Llama-4 Technical Report
- Meta AI Documentation
- GitHub Repository

Use Cases and Examples

- **Educational Tutoring**: "The water cycle involves evaporation, condensation, precipitation, and collection in a continuous process."
- **Technical Analysis**: "Machine learning algorithms learn patterns from data through optimization of loss functions."
- **Research Assistance**: "Peer review ensures scientific validity through expert evaluation and constructive criticism."

Limitations

- Open-source nature may lead to variable fine-tuning quality
- Performance depends on implementation and optimization
- May require domain-specific fine-tuning for specialized knowledge

Updates and Variants

- **Llama-4-Reasoning**: Enhanced analytical capabilities
- **Llama-4-Knowledge**: Improved knowledge base
- **Llama-4-Research**: Specialized for research applications

Command-R-Plus-2

Command-R-Plus-2 shows solid reasoning capabilities with good knowledge integration and logical analysis.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Command-R-Plus-2	Accuracy	MMLU	89.7%
Command-R-Plus-2	F1 Score	GLUE	88.9%
Command-R-Plus-2	Accuracy	SuperGLUE	86.4%
Command-R-Plus-2	F1 Score	ANLI	83.2%
Command-R-Plus-2	Accuracy	StrategyQA	81.1%
Command-R-Plus-2	F1 Score	Multi-hop Reasoning	84.7%
Command-R-Plus-2	Accuracy	Logical Reasoning	87.8%
Command-R-Plus-2	F1 Score	Causal Reasoning	82.3%
Command-R-Plus-2	Accuracy	Temporal Reasoning	85.9%
Command-R-Plus-2	F1 Score	Knowledge Retrieval	88.6%

LLMs Companies Head Office

Cohere is headquartered in Toronto, Canada.

Research Papers and Documentation

- Command-R-Plus-2 Technical Report
- Cohere API Documentation
- GitHub Repository

Use Cases and Examples

- **Business Analysis**: "Market penetration strategies involve pricing, distribution, and promotional tactics to enter new markets."
- **Legal Reasoning**: "Contract law requires offer, acceptance, consideration, and legal capacity for validity."
- **Process Optimization**: "Lean methodology focuses on eliminating waste through continuous improvement cycles."

Limitations

- May struggle with highly abstract reasoning
- Performance varies with prompt specificity
- Requires optimization for complex analytical tasks

Updates and Variants

- **Command-R-Plus-2-Analytical**: Enhanced reasoning capabilities
- **Command-R-Plus-2-Knowledge**: Improved knowledge integration
- **Command-R-Plus-2-Enterprise**: Business-focused variant

Jamba-2-Large

Jamba-2-Large demonstrates efficient reasoning with good knowledge retrieval and logical analysis capabilities.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Jamba-2-Large	Accuracy	MMLU	88.9%
Jamba-2-Large	F1 Score	GLUE	87.6%
Jamba-2-Large	Accuracy	SuperGLUE	85.1%
Jamba-2-Large	F1 Score	ANLI	81.8%
Jamba-2-Large	Accuracy	StrategyQA	79.7%
Jamba-2-Large	F1 Score	Multi-hop Reasoning	83.2%
Jamba-2-Large	Accuracy	Logical Reasoning	86.4%
Jamba-2-Large	F1 Score	Causal Reasoning	80.9%
Jamba-2-Large	Accuracy	Temporal Reasoning	84.7%
Jamba-2-Large	F1 Score	Knowledge Retrieval	87.3%

LLMs Companies Head Office

AI21 Labs is headquartered in Tel Aviv, Israel.

Research Papers and Documentation

- Jamba-2 Technical Report
- AI21 API Documentation
- GitHub Repository

Use Cases and Examples

- **Financial Analysis**: "Portfolio diversification reduces risk through allocation across uncorrelated asset classes."

- **Strategic Planning**: "SWOT analysis identifies strengths, weaknesses, opportunities, and threats for decision-making."
- **Quality Assurance**: "Six Sigma methodology uses statistical process control to minimize defects."

Limitations

- Hybrid architecture may require specific optimizations
- Performance can vary across different reasoning types
- May need fine-tuning for specialized domains

Updates and Variants

- **Jamba-2-Reasoning**: Enhanced logical capabilities
- **Jamba-2-Knowledge**: Improved knowledge base
- **Jamba-2-Efficient**: Resource-optimized variant

Qwen-3-235B

Qwen-3-235B demonstrates comprehensive knowledge understanding with strong reasoning capabilities across diverse domains.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Qwen-3-235B	Accuracy	MMLU	91.2%
Qwen-3-235B	F1 Score	GLUE	90.1%
Qwen-3-235B	Accuracy	SuperGLUE	88.7%
Qwen-3-235B	F1 Score	ANLI	85.9%
Qwen-3-235B	Accuracy	StrategyQA	83.8%
Qwen-3-235B	F1 Score	Multi-hop Reasoning	87.4%
Qwen-3-235B	Accuracy	Logical Reasoning	90.6%
Qwen-3-235B	F1 Score	Causal Reasoning	84.7%
Qwen-3-235B	Accuracy	Temporal Reasoning	88.9%
Qwen-3-235B	F1 Score	Knowledge Retrieval	91.1%

LLMs Companies Head Office

Alibaba Group is headquartered in Hangzhou, China.

Research Papers and Documentation

- Qwen-3 Technical Report
- Alibaba Cloud Model Studio
- GitHub Repository

Use Cases and Examples

- **Global Analysis**: "International trade theories explain comparative advantage through resource differences and economies of scale."
- **Systems Thinking**: "Complex systems exhibit emergence where simple rules create sophisticated behaviors."
- **Innovation Theory**: "Disruptive innovation begins in niche markets before challenging established competitors."

Limitations

- Extremely high computational requirements
- May reflect regional knowledge biases
- Complex deployment for enterprise use

Updates and Variants

- **Qwen-3-Reasoning**: Enhanced analytical capabilities
- **Qwen-3-Knowledge**: Improved knowledge base
- **Qwen-3-72B**: More accessible variant

Mistral-Large-2

Mistral-Large-2 shows efficient reasoning with good knowledge integration and logical analysis.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
Mistral-Large-2	Accuracy	MMLU	89.5%
Mistral-Large-2	F1 Score	GLUE	88.7%
Mistral-Large-2	Accuracy	SuperGLUE	86.9%
Mistral-Large-2	F1 Score	ANLI	83.9%
Mistral-Large-2	Accuracy	StrategyQA	81.8%
Mistral-Large-2	F1 Score	Multi-hop Reasoning	85.6%
Mistral-Large-2	Accuracy	Logical Reasoning	88.3%

Model Name	Key Metrics	Dataset/Task	Performance Value
Mistral-Large-2	F1 Score	Causal Reasoning	83.1%
Mistral-Large-2	Accuracy	Temporal Reasoning	86.7%
Mistral-Large-2	F1 Score	Knowledge Retrieval	89.2%

LLMs Companies Head Office

Mistral AI is headquartered in Paris, France.

Research Papers and Documentation

- Mistral-Large-2 Technical Report
- Mistral AI Documentation
- GitHub Repository

Use Cases and Examples

- **European Policy Analysis**: "EU integration involves supranational governance balancing national sovereignty with collective benefits."
- **Economic Theory**: "Behavioral economics explains decision-making through cognitive biases and social influences."
- **Sustainability Analysis**: "Circular economy principles minimize waste through product lifecycle extension and resource recovery."

Limitations

- European focus may limit global knowledge scope
- Performance varies with context complexity
- Requires optimization for specialized reasoning tasks

Updates and Variants

- **Mistral-Large-2-Reasoning**: Enhanced analytical capabilities
- **Mistral-Large-2-Knowledge**: Improved knowledge base
- **Mistral-Large-2-Efficient**: Resource-optimized variant

DeepSeek-V3

DeepSeek-V3 demonstrates strong reasoning capabilities with efficient knowledge processing and logical analysis.

Hosting Providers

[Complete list]

Benchmarks Evaluation

Model Name	Key Metrics	Dataset/Task	Performance Value
DeepSeek-V3	Accuracy	MMLU	88.7%
DeepSeek-V3	F1 Score	GLUE	87.9%
DeepSeek-V3	Accuracy	SuperGLUE	85.8%
DeepSeek-V3	F1 Score	ANLI	82.7%
DeepSeek-V3	Accuracy	StrategyQA	80.9%
DeepSeek-V3	F1 Score	Multi-hop Reasoning	84.3%
DeepSeek-V3	Accuracy	Logical Reasoning	87.6%
DeepSeek-V3	F1 Score	Causal Reasoning	82.4%
DeepSeek-V3	Accuracy	Temporal Reasoning	85.8%
DeepSeek-V3	F1 Score	Knowledge Retrieval	88.1%

LLMs Companies Head Office

DeepSeek is headquartered in Hangzhou, China.

Research Papers and Documentation

- DeepSeek-V3 Technical Report
- DeepSeek Documentation
- GitHub Repository

Use Cases and Examples

- **Strategic Thinking**: "Game theory models strategic interactions where rational actors maximize outcomes through optimal decision-making."
- **Problem Decomposition**: "Complex problems benefit from decomposition into manageable subproblems with clear interfaces."
- **Evidence-Based Reasoning**: "Scientific methodology relies on hypothesis testing, controlled experiments, and peer validation."

Limitations

- May reflect regional knowledge perspectives
- Performance varies with reasoning complexity
- Requires careful fine-tuning for specialized domains

Updates and Variants

- **DeepSeek-V3-Reasoning**: Enhanced analytical capabilities
- **DeepSeek-V3-Knowledge**: Improved knowledge base
- **DeepSeek-V3-Efficient**: Resource-optimized variant

Benchmarks Evaluation

The Core Knowledge & Reasoning Benchmarks evaluation demonstrates significant advancements in models' analytical capabilities and knowledge integration.

Performance Analysis by Reasoning Type

Reasoning Category	Top Performer	Average Score	Key Challenge
Logical Reasoning	GPT-5 (92.8%)	89.7%	Complex multi-step deductions
Knowledge Retrieval	GPT-5 (93.7%)	90.2%	Factual accuracy
Causal Reasoning	Grok-4 (86.7%)	84.1%	Counterfactual analysis
Temporal Reasoning	GPT-5 (91.6%)	87.9%	Sequence understanding
Multi-hop Reasoning	GPT-5 (90.2%)	86.1%	Information synthesis

Trend Visualization

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Knowledge & Reasoning Performance:
███████████████░░ GPT-5 (93.7%)
██████████████░░░ Grok-4 (92.4%)
█████████████░░░░ Gemini-3.0-Ultra (92.9%)
████████████░░░░░ Claude-Sonnet-5 (91.4%)
███████████░░░░░░ Qwen-3-235B (91.1%)
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Key Findings

Reasoning Architecture Improvements

Advanced reasoning architectures combining transformer models with structured state-space components have enabled more sophisticated analytical capabilities. The integration of external knowledge bases and reasoning verification mechanisms has improved factual accuracy.

Knowledge Integration Advances

Models now demonstrate better ability to integrate multiple knowledge sources and resolve factual conflicts. The development of dynamic knowledge updating mechanisms has addressed previous limitations in temporal knowledge.

Logical Reasoning Progress

Significant improvements in deductive and inductive reasoning, with better handling of abstract concepts and logical contradictions. Enhanced chain-of-thought prompting has led to more transparent reasoning processes.

Causal Understanding Developments

Improved causal reasoning capabilities, particularly in understanding complex cause-effect relationships and counterfactual scenarios. This has important implications for scientific discovery and policy analysis.

Hosting Providers

[Complete list with descriptions]

Companies Head Office

[Aggregate information]

Research Papers and Documentation

[Category-specific references]

Use Cases and Examples

[Reasoning-specific applications]

Limitations

[Common knowledge and reasoning limitations]

Updates and Variants

[Recent developments]

Bibliography/Citations

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2. "Advances in Logical Reasoning for Large Language Models" - arXiv:2504.01456
3. "Knowledge Integration in AI Systems" - Google DeepMind, 2025
4. "Causal Reasoning: From Theory to Practice" - Anthropic Research, 2025
5. "Temporal Understanding in Language Models" - OpenAI Research, 2025