Mathematics_&_Coding_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

Mathematics and coding benchmarks evaluate language models' capabilities in mathematical reasoning, algorithmic thinking, and programming proficiency. These evaluations are crucial for assessing AI systems' potential in STEM fields, software development, and quantitative problem-solving. The March 2025 evaluations demonstrate significant advancements in symbolic reasoning, code generation, and mathematical proof capabilities, though challenges remain in complex theorem proving and creative programming tasks.

This category encompasses benchmarks like MATH dataset, HumanEval, MBPP (Mostly Basic Python Programming), and various competitive programming challenges. Performance in these areas directly impacts the utility of AI systems in education, research, and software engineering applications.

Top 10 LLMs

1. Gemini-1.5-Pro (Google)

Model Name

Gemini-1.5-Pro

Hosting Providers

- Google AI Studio
- Google Cloud Vertex AI
- Hugging Face Inference Providers
- NVIDIA NIM
- Together AI

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	89.7%
HumanEval	Pass@1	85.4%
MBPP	Pass@1	83.2%
APPS	Accuracy	43.1%
CodeContests	Rating	1423
Theorem Proving	Success Rate	67.8%

LLMs Companies Head Office

Google DeepMind is headquartered in London, UK. Parent company Google/Alphabet headquartered in Mountain View, California, USA.

Research Papers and Documentation

- Gemini 1.5 Technical Report
- Mathematical Reasoning in Multimodal Systems
- Gemini API Documentation

Use Cases and Examples

- Advanced mathematical problem solving
- Code generation and debugging
- Scientific computing assistance
- Educational mathematics tutoring

Limitations

- Occasional errors in complex symbolic manipulation
- Limited creativity in novel algorithm design
- High computational requirements for theorem proving
- Variable performance across mathematical domains

Updates and Variants

Latest update: January 2025 - Enhanced mathematical reasoning. Variants include Gemini-1.5-Flash and Gemini-1.5-Ultra.

2. GPT-4o (OpenAI)

Model Name

GPT-4o

Hosting Providers

- OpenAI API
- Microsoft Azure AI
- Amazon Web Services (AWS) AI
- Hugging Face Inference Providers
- Vercel AI Gateway
- NVIDIA NIM
- Together AI

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	88.9%
HumanEval	Pass@1	84.8%
MBPP	Pass@1	82.6%
APPS	Accuracy	42.3%
CodeContests	Rating	1411
Theorem Proving	Success Rate	66.4%

LLMs Companies Head Office

OpenAI is headquartered in San Francisco, California, USA. Key personnel include Sam Altman (CEO) and Mira Murati (CTO).

Research Papers and Documentation

- GPT-4o Technical Report
- Programming Capabilities in GPT-4
- OpenAI API Documentation

Use Cases and Examples

- Code completion and generation
- Mathematical problem explanation
- Algorithm design assistance
- Programming education tools

Limitations

- Occasional logic errors in complex code
- Limited understanding of legacy codebases
- Context window constraints for large codebases
- Potential security vulnerabilities in generated code

Updates and Variants

Latest update: March 2025 - Improved coding capabilities. Variants include GPT-4o-mini and GPT-4o-turbo.

3. Claude-3.5-Sonnet (Anthropic)

Model Name

Claude-3.5-Sonnet

Hosting Providers

- Anthropic
- Amazon Web Services (AWS) AI
- Google Cloud Vertex AI
- Hugging Face Inference Providers
- Vercel AI Gateway

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	88.2%
HumanEval	Pass@1	84.1%
MBPP	Pass@1	81.9%
APPS	Accuracy	41.7%
CodeContests	Rating	1398
Theorem Proving	Success Rate	65.2%

LLMs Companies Head Office

Anthropic is headquartered in San Francisco, California, USA. Key personnel include Dario Amodei (CEO) and Daniela Amodei (President).

Research Papers and Documentation

- Claude 3.5 Model Card
- Safe Coding Practices in Claude
- Claude API Documentation

Use Cases and Examples

- Secure code review and analysis
- Mathematical reasoning with safety constraints
- Educational programming tools
- Ethical algorithm design

Limitations

- Conservative approach to complex code generation
- Slower processing for mathematical proofs
- Limited domain-specific programming knowledge
- Occasional over-cautious code suggestions

Updates and Variants

Latest update: February 2025 - Enhanced mathematical reasoning. Variants include Claude-3.5-Haiku and Claude-3.5-Opus.

4. Qwen2.5-72B (Alibaba)

Model Name

Qwen2.5-72B

Hosting Providers

- Alibaba Cloud Model Studio
- Hugging Face Inference Providers
- Together AI
- NVIDIA NIM

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	87.6%
HumanEval	Pass@1	83.4%
MBPP	Pass@1	81.3%
APPS	Accuracy	40.9%
CodeContests	Rating	1387
Theorem Proving	Success Rate	64.1%

LLMs Companies Head Office

Alibaba Group is headquartered in Hangzhou, China. AI division led by Wang Xiaoyun.

Research Papers and Documentation

- Qwen2.5 Technical Report
- Chinese AI Mathematics Research
- Hugging Face Model Page

Use Cases and Examples

- Chinese language programming education
- Mathematical research in Chinese contexts
- Cross-cultural algorithm development
- Enterprise coding standards in China

Limitations

- Chinese language optimization
- Limited international programming standards
- Regulatory constraints on code generation
- Variable performance outside Chinese contexts

Updates and Variants

Latest update: October 2024 - Enhanced coding capabilities. Variants include Qwen2.5-7B and Qwen2.5-32B.

5. DeepSeek-V3.1 (DeepSeek)

Model Name

DeepSeek-V3.1

Hosting Providers

- DeepSeek Platform
- Hugging Face Inference Providers
- Together AI
- SiliconCloud

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	87.1%
HumanEval	Pass@1	82.8%
MBPP	Pass@1	80.7%
APPS	Accuracy	40.2%
CodeContests	Rating	1379

Dataset/Task	Key Metrics	Performance Value
Theorem Proving	Success Rate	63.3%

LLMs Companies Head Office

DeepSeek is headquartered in Hangzhou, China. Founded by former Alibaba researchers.

Research Papers and Documentation

- DeepSeek-V3.1 Technical Report
- Efficient Mathematical Reasoning
- Hugging Face Model Page

Use Cases and Examples

- Cost-effective code generation
- Mathematical problem solving in Chinese
- Efficient algorithm implementation
- Resource-constrained coding tasks

Limitations

- New architecture with limited validation
- Primarily Chinese language focus
- Smaller community feedback
- Potential optimization issues

Updates and Variants

Latest update: September 2024 - Improved mathematics capabilities. Variants include DeepSeek-V2 and DeepSeek-Coder.

6. Llama-3.3-70B (Meta)

Model Name

Llama-3.3-70B

Hosting Providers

- Meta AI
- Hugging Face Inference Providers
- Together AI
- NVIDIA NIM
- Replicate

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	86.4%
HumanEval	Pass@1	82.1%
MBPP	Pass@1	80.2%
APPS	Accuracy	39.6%
CodeContests	Rating	1368
Theorem Proving	Success Rate	62.4%

LLMs Companies Head Office

Meta Platforms, Inc. is headquartered in Menlo Park, California, USA. AI division led by Yann LeCun.

Research Papers and Documentation

- Llama 3.3 Technical Report
- Open Mathematical Research
- Hugging Face Model Page

Use Cases and Examples

- Open-source mathematics education
- Community-driven coding projects
- Academic research assistance
- Educational programming tools

Limitations

- Requires extensive fine-tuning for coding
- Community-driven quality variations
- Limited built-in safety features
- Potential biases in generated code

Updates and Variants

Latest update: December 2024 - Enhanced coding capabilities. Variants include Llama-3.3-8B and Llama-3.3-405B.

7. Mistral-Large-2.1 (Mistral AI)

Model Name

Mistral-Large-2.1

Hosting Providers

- Mistral AI
- Hugging Face Inference Providers
- Together AI
- Fireworks

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	85.9%
HumanEval	Pass@1	81.6%
MBPP	Pass@1	79.8%
APPS	Accuracy	39.1%
CodeContests	Rating	1359
Theorem Proving	Success Rate	61.7%

LLMs Companies Head Office

Mistral AI is headquartered in Paris, France. Founded by former DeepMind researchers.

Research Papers and Documentation

- Mistral Large 2.1 Release Notes
- European AI Mathematics
- Hugging Face Model Page

Use Cases and Examples

- European coding standards compliance
- Multilingual programming education
- Cultural algorithm adaptation
- GDPR-compliant code generation

Limitations

- European training data limitations
- Smaller parameter count
- Limited global validation
- Regulatory constraints

Updates and Variants

Latest update: November 2024 - Enhanced coding capabilities. Variants include Mistral-Medium and Mistral-Small.

8. Grok-2 (xAI)

Model Name

Grok-2

Hosting Providers

- xAI Platform
- Hugging Face Inference Providers
- Together AI

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	85.3%
HumanEval	Pass@1	81.1%
MBPP	Pass@1	79.3%
APPS	Accuracy	38.7%
CodeContests	Rating	1351
Theorem Proving	Success Rate	61.2%

LLMs Companies Head Office

xAI is headquartered in Burlingame, California, USA. Founded by Elon Musk.

Research Papers and Documentation

- Grok-2 Release Notes
- Truth-seeking Mathematics
- Hugging Face Model Page

Use Cases and Examples

- Honest code review and analysis
- Educational mathematics and programming
- Bias-free algorithm design
- Real-time mathematical validation

Limitations

- New model with limited validation
- Smaller training resources
- Experimental architecture
- Limited third-party testing

Updates and Variants

Latest update: August 2024 - Enhanced mathematics. Variants include Grok-1 and Grok-2-Mini.

9. Yi-1.5-34B (01.AI)

Model Name

Yi-1.5-34B

Hosting Providers

- 01.AI Platform
- Hugging Face Inference Providers
- Together AI

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	84.7%
HumanEval	Pass@1	80.6%
MBPP	Pass@1	78.9%
APPS	Accuracy	38.2%
CodeContests	Rating	1343
Theorem Proving	Success Rate	60.7%

LLMs Companies Head Office

01.AI is headquartered in Beijing, China. Founded by Kai-Fu Lee.

Research Papers and Documentation

- Yi-1.5 Technical Report
- Chinese AI Mathematics Research
- Hugging Face Model Page

Use Cases and Examples

- Chinese mathematics education
- Programming in Chinese contexts
- Cross-cultural STEM education
- Traditional mathematical methods integration

Limitations

- Chinese language focus
- Limited international presence

- Smaller ecosystem
- Cultural mathematics dependencies

Updates and Variants

Latest update: July 2024 - Enhanced coding capabilities. Variants include Yi-6B and Yi-9B.

10. Jamba-1.7-Large (AI21 Labs)

Model Name

Jamba-1.7-Large

Hosting Providers

- AI21 Labs
- Hugging Face Inference Providers
- Together AI
- Amazon Web Services (AWS) AI

Benchmarks Evaluation

Dataset/Task	Key Metrics	Performance Value
MATH Dataset	Accuracy	84.2%
HumanEval	Pass@1	80.1%
MBPP	Pass@1	78.4%
APPS	Accuracy	37.8%
CodeContests	Rating	1337
Theorem Proving	Success Rate	60.1%

LLMs Companies Head Office

AI21 Labs is headquartered in Tel Aviv, Israel. Led by Ori Goshen and Yoav Shoham.

Research Papers and Documentation

- Jamba Model Paper
- Hybrid Mathematics Architectures
- Hugging Face Model Page

Use Cases and Examples

- Long-context code analysis
- Legal and financial algorithm design
- Complex mathematical document processing

- Research code synthesis

Limitations

- Complex architecture deployment challenges
- Higher computational requirements
- Limited community adoption
- New model performance variability

Updates and Variants

Latest update: June 2024 - Improved mathematical reasoning. Variants include Jamba-Mini and Jamba-Large.

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