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Submitter Information

Organization: Qubik

General Comment

See attached file(s)

Attachments

Request for Information - Development of a 2025 National Artificial Intelligence Research and Development Strategic Plan - Docket ID
NSF-2025-OGC-0001

Comment to the Networking and Information Technology Research and Development (NITRD) National Coordination Office, National Science Foundation

Re: Request for Information on the Development of a 2025 National Artificial Intelligence (AI) Research and Development Strategic Plan

Docket ID: NSF-2025-OGC-0001

As the CEO and Founder of Qubik, a U.S.-based innovator in AI data solutions, I am pleased to submit this comment in response to the NITRD National Coordination Office's request for input on the 2025 National AI R&D Strategic Plan, as outlined in the Federal Register notice published on April 29, 2025. Qubik's proprietary "Huge Data" database, seamlessly integrated with its innovative puzzle systems, delivers plentiful, unbiased, accurate, and measurable data to advance AI benchmarking and development for safer, more reliable, and precise outcomes.

Overview of Qubik's Puzzle and Database Technology

Qubik's "Huge Data" database, a proprietary system with a unique structure, is designed to support its puzzle systems, the Qubik 25Queuebik2D and Qubik 25Queuebik3D, managing a dataset of over 32 decillion (3.2×10^{34}) unique patterns for 25-layer puzzles—surpassing the storage capacity of all global hard drives combined. For instance, a single 54-move puzzle in the Qubik 25Queuebik2D Puzzle offers over 2.8 decillion (2.8×10^{33}) unique patterns. Unlike traditional databases, "Huge Data" is keyed to the mathematical structure of Qubik's puzzles, operating efficiently on a single server. While the server includes a GPU, the C# code implementing the database logic does not explicitly utilize it, relying on optimized algorithms to process patterns in under 0.001 seconds once received from the client, with total retrieval time, including network latency via a TCP/UDP connection, typically under 0.1 seconds.

Qubik's puzzles differ from a Rubik's Cube: each of the 25 layers moves independently, restricted to one quarter-turn at a time, and is "super solved" when returned to its original position, not merely when colors align. The puzzles include:

- **Qubik 25Queuebik2D Puzzle:** A 2D puzzle with 25 layers, each movable left, right, up, or down in quarter-turn increments, spanning 0 to 100 moves.
- **Qubik 25Queuebik3D Puzzle:** A 3D variant adding clockwise and counter-clockwise rotations, with the same number of puzzles across 0 to 75 moves.

Each puzzle design has a distinct dataset within the "Huge Data" database, tailored to its mathematical structure. The database's design draws inspiration from my patent-pending Non-Provisional Patent Application (18/676,001), "SYSTEMS AND METHODS FOR CONFIGURING A UNIQUE PUZZLE PATTERN" (Paragraph [0083]), though it is not claimed therein. An illustrative analogy from the patent conveys its approach: imagine dropping a marble through a matrix of nails, where each row guides the marble to a specific gap, determining its path. The unique path reveals the marble's original size. Similarly, Qubik's "Huge Data" uses specially constructed sets of numbers, based on the mathematics of Qubik puzzles, to navigate and pinpoint patterns efficiently, though the true details remain proprietary.

Qubik's Minimum Viable Product (MVP) features a Windows Presentation Foundation (WPF) Graphical User Interface (GUI). Users select a puzzle by move count, and once downloaded from the "Huge Data" database, no further queries are made until a new puzzle is requested. The GUI handles all operations locally, providing immediate, unbiased feedback indicating whether a move reduces or increases the minimum number of moves to solve the puzzle, instant access to complete solutions, and tracking solving time up to one hour, displaying ">= 1 Hour" for durations at or above one hour, with a new game resetting the timer.

Importance of Plentiful, Unbiased, Accurate, and Measurable Data

High-quality data is critical for AI training and benchmarking. Qubik's "Huge Data" database excels by providing:

- **Plentiful Data:** Over 32 decillion patterns for 25-layer puzzles ensure an immense dataset, designed to support increasingly complex configurations for robust AI testing and training.
- **Unbiased Data:** Systematically generated patterns eliminate human biases, ensuring fair and neutral evaluations.
- **Accurate Data:** Each pattern and its solution is 100% correct, setting a gold standard for AI reliability.
- **Measurable Progress:** Real-time feedback, time tracking, and move-count difficulty selection provide precise metrics for quantifying AI performance.

These qualities make Qubik's database a vital resource for developing safer, more accurate AI systems, addressing key challenges in data quality and benchmarking.

Alignment with NITRD Priorities

Qubik's integrated puzzle and database technology supports the 2025 National AI R&D Strategic Plan's objectives:

- **Securing U.S. Leadership in AI:** By enabling superior benchmarking with high-quality data, Qubik enhances AI performance and safety, strengthening U.S. leadership over the next 2-5 years.
- **Federal Government's Role:** Supporting innovative, high-risk systems like Qubik's "Huge Data" database, which may lack private sector investment due to its unconventional structure, can accelerate national AI advancements.
- **Research Needs and Challenges:** Qubik provides plentiful, unbiased, and accurate data with measurable metrics, advancing research in fundamental algorithms, AI standards, reasoning/adaptability, and applications in scientific discovery and national security.
- **Novel Partnership Mechanisms:** Public-private partnerships can apply Qubik's technology to cybersecurity, healthcare (e.g., DNA sequencing), and logistics, with collaborative research driving innovation.
- **Prioritized Areas:**
 - **Fundamental AI Algorithms:** Testing algorithms with perfect data.
 - **AI for Scientific Discovery:** Supporting protein folding and medical research.
 - **Reasoning/Adaptability:** Enhancing AI problem-solving with puzzle-based logic.
 - **AI Standards/Security/Reliability:** Ensuring trustworthy AI with accurate, unbiased data.

Potential Applications Beyond Puzzles

As noted in my patent application, Qubik's database principles extend to:

- **Logistics Optimization:** Streamlining routing and supply chains.
- **DNA Sequencing:** Managing large genetic datasets efficiently.
- **Medical Research:** Accelerating cancer cures through data processing.

These align with national priorities in economic competitiveness and healthcare.

Recommendations for the 2025 Strategic Plan

To leverage Qubik's technology, I recommend:

- **Funding Support:** Invest in Qubik's innovative database technology, which enables immediate access to massive datasets, addressing AI's data quality and quantity challenges well before large-scale data centers are operational, and similar non-traditional systems.
- **Research Collaborations:** Foster interdisciplinary initiatives to explore Qubik's "Huge Data" in AI benchmarking and scientific applications.
- **Standardization Efforts:** Develop AI benchmarking standards using Qubik's "Huge Data" to ensure safety and reliability.

Conclusion

Qubik's integrated "Huge Data" database and puzzle technology redefines AI data management by delivering plentiful, unbiased, accurate, and measurable data, handling datasets larger than all global hard drives combined. Its unique design, tailored to Qubik's puzzle mathematics, makes it a cornerstone for future AI research. I believe Qubik's technology can enhance AI learning efficiency and serve as a foundational tool for addressing complex challenges across multiple domains.

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