PROVISIONAL APPLICATION FOR PATENT

**INVENTION TITLE**

[0001] This invention is a financial modeling system that treats data as a quantum field, using novel algorithms to analyze bit-level transitions for predicting pattern collapse and applying Riemannian geometry to evolve and optimize these financial patterns for predictive accuracy. It is a comprehensive system that integrates quantum-inspired analytics with evolutionary computation to create a self-optimizing engine for financial trading and risk management.

**BACKGROUND OF THE INVENTION**

**[0002] Problem Solved:** Traditional financial modeling systems fail to predict pattern collapse in real-time because they rely on reactive, inefficient algorithms that cannot navigate the complex, non-linear nature of modern markets, leading to significant financial losses and missed opportunities.

**[0003]** People using current financial modeling solutions face several critical problems that lead to financial losses and missed opportunities. Traditional algorithms suffer from pattern recognition lag, meaning they only identify market changes after they have already happened. Statistical methods and standard AI models are plagued by high rates of false signals, especially in volatile markets, and often operate as un-interpretable "black boxes," making it impossible to understand their decision-making process. Furthermore, conventional optimization techniques are constrained by Euclidean assumptions that do not apply to complex financial markets, causing them to get trapped in suboptimal solutions (local minima) and failing to find the best possible trading strategies. Finally, existing systems are static; their patterns and strategies do not adapt to changing market conditions without manual reconfiguration and cannot improve themselves based on performance.

**[0004]** My invention solves these problems through its unique, integrated architecture. It eliminates pattern recognition lag by using the QFH and QBSA modules to analyze data at the bit-level and predict pattern degradation and collapse before it happens, shifting from a reactive to a predictive model. It overcomes the "black box" problem by using a mathematically transparent framework based on quantum mechanics and Riemannian geometry, providing clear, interpretable reasons for its predictions. The Quantum Manifold Optimizer directly solves the issue of suboptimal solutions by navigating the complex, curved, non-linear space of financial patterns to find globally optimal strategies that traditional methods miss. Lastly, the Pattern Evolution System solves the problem of static, outdated models by treating financial patterns as evolving entities that automatically adapt and improve themselves based on their historical performance, ensuring the system remains effective in constantly changing markets.

**DETAILED DESCRIPTION OF THE INVENTION**

**[0005]** As stated above, Traditional financial modeling systems fail to predict pattern collapse in real-time because they rely on reactive, inefficient algorithms that cannot navigate the complex, non-linear nature of modern markets, leading to significant financial losses and missed opportunities. The invention claimed here solves this problem.

**[0006]** This invention solves the problem by treating financial data as a quantum system, allowing it to predict pattern degradation before it occurs. It uses Riemannian geometry to optimize patterns in complex, non-linear financial space, and applies evolutionary algorithms to ensure the system's predictive models continuously adapt and improve their own performance.

**[0007]** The claimed invention differs from what currently exists. My invention is fundamentally different from existing solutions because it does not attempt to merely process historical financial data; instead, it treats data as a quantum system to predict its future state. Unlike traditional technical analysis, which is reactive, or machine learning "black boxes," which are not interpretable, my invention provides a mathematically rigorous and predictive framework based on quantum-inspired principles and Riemannian geometry. Its key differentiators are its ability to detect pattern collapse before it occurs by analyzing bit-level transitions (the QFH and QBSA modules), its use of manifold optimization to navigate complex, non-linear financial spaces and avoid suboptimal solutions, and its evolutionary engine that allows it to automatically improve its own predictive patterns over time. This creates a self-optimizing, predictive system that is faster, more accurate,

**[0008]** This invention is an improvement on what currently exists. My invention solves these problems through its unique, integrated architecture. It eliminates pattern recognition lag by using the QFH and QBSA modules to analyze data at the bit-level and predict pattern degradation and collapse before it happens, shifting from a reactive to a predictive model. It overcomes the "black box" problem by using a mathematically transparent framework based on quantum mechanics and Riemannian geometry, providing clear, interpretable reasons for its predictions. The Quantum Manifold Optimizer directly solves the issue of suboptimal solutions by navigating the complex, curved, non-linear space of financial patterns to find globally optimal strategies that traditional methods miss. Lastly, the Pattern Evolution System solves the problem of static, outdated models by treating financial patterns as evolving entities that automatically adapt and improve themselves based on their historical performance, ensuring the system remains effective in constantly changing markets.

**[0009]** My invention solves these problems through its unique, integrated architecture. It eliminates pattern recognition lag by using the QFH and QBSA modules to analyze data at the bit-level and predict pattern degradation and collapse before it happens, shifting from a reactive to a predictive model. It overcomes the "black box" problem by using a mathematically transparent framework based on quantum mechanics and Riemannian geometry, providing clear, interpretable reasons for its predictions. The Quantum Manifold Optimizer directly solves the issue of suboptimal solutions by navigating the complex, curved, non-linear space of financial patterns to find globally optimal strategies that traditional methods miss. Lastly, the Pattern Evolution System solves the problem of static, outdated models by treating financial patterns as evolving entities that automatically adapt and improve themselves based on their historical performance, ensuring the system remains effective in constantly changing markets.

**[0010]** Also, it can produce Yes. The invention can be embodied in several forms: A Hardware Co-processor: The algorithms can be implemented on a specialized hardware device, such as an FPGA or ASIC, to create a high-throughput "coherence processor" that can be integrated into servers, network appliances, or embedded systems. A Software Development Kit (SDK): It can be packaged as a C++ library or SDK, allowing developers in various industries to integrate its quantum-inspired analytical and optimization capabilities into their own applications. A Turnkey Analytical Appliance: The invention can be delivered as a complete hardware and software system (a server appliance) for a specific task, such as a real-time trading/risk management workstation or a network security monitoring box. Novel Data Compositions: The Pattern Evolution engine itself produces a useful output: optimized, evolved financial patterns or trading strategies. These strategies, being novel and non-obvious compositions of data, can be licensed or sold as distinct intellectual property products.

**The Version of The Invention Discussed Here Includes**:

**[0011]** 1. A data ingestion and binarization module.

**[0012]** 2. A Quantum Field Harmonics (QFH) analysis module, which includes components for classifying bit transitions into NULL\_STATE, FLIP, or RUPTURE states.

**[0013]** 3. A Quantum Bit State Analysis (QBSA) validation module, which includes a component for calculating a "correction ratio" based on probe and expectation indices.

**[0014]** 4. A Quantum Manifold Optimizer module, which includes components for mapping financial patterns to a Riemannian manifold and for sampling a tangent space.

**[0015]** 5. A Pattern Evolution System module, which includes components for generational pattern tracking and for calculating relationship strengths between patterns.

**[0016]** 6. A system integration and data processing pipeline that sequentially links the QFH, QBSA, Manifold Optimizer, and Pattern Evolution modules.

**[0017]** 7. A decision output module that generates trading signals, risk alerts, or optimized pattern data.

**Relationship Between The Components**:

**[0018]** The data ingestion and binarization module (1) acquires and prepares raw data, which is then fed into the Quantum Field Harmonics (QFH) analysis module (2). The QFH module (2) analyzes this data to classify bit transitions and identify initial pattern states, passing these classified states to the Quantum Bit State Analysis (QBSA) validation module (3) for error checking and pattern integrity validation. The validated and corrected pattern data from the QBSA module (3) is then sent to the Quantum Manifold Optimizer module (4), which enhances the pattern by navigating a complex, non-linear space. The optimized pattern from module (4) is subsequently processed by the Pattern Evolution System module (5) to adapt and improve it based on historical performance and relationships with other patterns. The system integration and data processing pipeline (6) manages this entire sequential data flow, ensuring that the output of each module serves as the input for the next. Finally, the fully processed, optimized, and evolved pattern information from module (5) is passed to the decision output module (7), which generates the final actionable output, such as trading signals or risk alerts.

**How The Invention Works:**

**[0019]** Individually, each component performs a distinct and essential step in transforming raw data into predictive, optimized intelligence. The \*\*Data Ingestion and Binarization Module (1)\*\* works by taking any form of input data and converting it into a standardized binary stream, which is the universal language the rest of the system understands. The \*\*Quantum Field Harmonics (QFH) Analysis Module (2)\*\* then works on this binary stream by examining adjacent bit pairs to classify their transition, thereby identifying the fundamental state of the data as stable, oscillating, or potentially collapsing (`RUPTURE`). Following this, the \*\*Quantum Bit State Analysis (QBSA) Validation Module (3)\*\* works by comparing the current data pattern against an expected pattern, calculating a "correction ratio" to quantify the pattern's health and predict its potential for future collapse. Once a pattern is validated, the \*\*Quantum Manifold Optimizer Module (4)\*\* works by translating the pattern's characteristics into coordinates on a multi-dimensional, curved geometric space (a Riemannian manifold) and finding the most efficient path to an improved state, allowing it to enhance the pattern in ways linear methods cannot. The \*\*Pattern Evolution System Module (5)\*\* then works by treating these optimized patterns as living entities with heritable traits, tracking their performance over time and using evolutionary algorithms to automatically breed superior, next-generation patterns. The \*\*System Integration and Data Processing Pipeline (6)\*\* works as the overarching operating system, directing the flow of data from one module to the next in a precise sequence. Finally, the \*\*Decision Output Module (7)\*\* works by taking the final, refined output from the pipeline and converting it into a simple, actionable command, such as a trading signal or a risk alert. Together, these components create a synergistic, multi-stage processing pipeline that achieves the invention's desired function. The process begins with raw data being standardized by module (1) and then analyzed for fundamental instabilities by module (2). This initial analysis is immediately passed to module (3) for a critical quality control and validation check, which prevents the system from acting on unhealthy or degrading patterns. Once a pattern is deemed viable, it is passed to module (4) for sophisticated, non-linear optimization, dramatically improving its potential effectiveness. This enhanced pattern is not static; it is fed into module (5), which ensures the system learns from its own performance and continuously improves its strategies over time. The entire workflow, from raw data to adaptive intelligence, is managed by the pipeline (6). The final result of this integrated process is then translated by module (7) into a concrete, high-value output. It is this unique, sequential combination of quantum-inspired analysis, predictive validation, geometric optimization, and evolutionary adaptation that allows the invention as a whole to perform its function of delivering accurate, predictive, and self-improving modeling in complex data environments.

**[0020]** The invention is implemented as a software system, and its operation is governed by a series of logical rules and procedures. Conditional logic, in the form of if-then-else statements, is fundamental to its operation; for example, the QFH module uses if-then relationships to classify a bit transition as NULL\_STATE, FLIP, or RUPTURE based on the values of consecutive bits. Similarly, the QBSA module uses an if-then statement to determine if a pattern is predicted to collapse by checking if its "correction ratio" has exceeded a predefined threshold. The system also relies on fundamental logical operators that function like logic gates (e.g., AND, OR, NOT) to evaluate these conditions. The entire architecture is built upon subroutines (also known as functions or methods in programming), where each distinct step, such as analyzing bit harmonics, validating pattern integrity, or optimizing a pattern, is encapsulated within its own dedicated block of code. Finally, procedural logic tools like loops are required to iterate over data streams and perform repetitive calculations, which is essential for processing financial data series.

**How To Make The Invention:**

**[0021]** In making the invention, the necessary elements constitute the core predictive analysis pipeline, while the optional elements provide advanced, self-improving capabilities. Necessary Elements: The Data Ingestion and Binarization Module is necessary to prepare and standardize incoming data. The Quantum Field Harmonics (QFH) Analysis Module is necessary for the initial, fundamental analysis of the data stream to detect instability. The Quantum Bit State Analysis (QBSA) Validation Module is necessary to validate the integrity of a pattern and provide the core predictive collapse detection. The System Integration and Data Processing Pipeline is necessary to manage the data flow between the core modules. The Decision Output Module is necessary to translate the analysis into an actionable signal. Optional Elements: The Quantum Manifold Optimizer Module is optional. While it significantly enhances the quality of patterns, the core invention can still function predictively without this geometric optimization step. The Pattern Evolution System Module is optional. The invention can function without the ability for patterns to self-evolve, although this module adds the critical long-term adaptive learning capability. Elements that could be added to make the invention work better: Yes, several elements could be added to enhance the invention's performance and capabilities. A machine learning module could be added to automatically optimize the adaptive thresholds used in the QBSA module or to guide the mutation and selection criteria in the Pattern Evolution System, making the invention even more autonomous. For enhanced security and transparency, a blockchain-based ledger system could be integrated to create an immutable audit trail of the pattern's lineage and performance over time. Finally, for broader applications, the system could be enhanced with multi-timeframe analysis capabilities, allowing it to simultaneously analyze patterns across different temporal scales, from microseconds to days.

**[0022]** Yes. The components are modular and can be constructed in different ways. For example, the Quantum Field Harmonics (QFH) analysis module (2) and the Quantum Bit State Analysis (QBSA) validation module (3) can be combined and used as a standalone, high-performance data integrity and signal detection system without the optimization or evolution components. Similarly, the Quantum Manifold Optimizer module (4) and the Pattern Evolution System module (5) can be assembled as a separate, advanced optimization engine for systems that already have their own data analysis methods. The invention can also be retrofitted. Individual modules can be integrated into existing financial analysis or algorithmic trading platforms to enhance specific capabilities. For instance, an existing trading system could retrofit the QBSA validation module (3) to add a predictive collapse detection layer to its current strategies, or it could integrate the Quantum Manifold Optimizer module (4) to improve the performance of its existing signal generation algorithms.

**[0023]** Additionally: Yes. The invention is a domain-agnostic system for analyzing, predicting, and optimizing patterns within any high-volume data stream. Its fundamental purpose is to detect emergent, predictive signals and optimize complex systems in noisy, non-linear environments. Therefore, its application extends beyond finance to any field where signal integrity, pattern stability, and adaptive optimization are critical. Describe the other problems your invention can solve or the other ways it can be used. The invention can solve problems in the following domains: Cybersecurity and Threat Intelligence: It can analyze network traffic or system logs in real-time to predict zero-day attacks by identifying subtle, pre-cursor patterns of compromise (incipient RUPTURE states) before a full breach occurs, solving the problem of reactive and signature-based threat detection being insufficient for novel attacks. Medical Signal Processing and Diagnostics: It can be used to analyze complex biological signals (e.g., EEG, ECG) to provide early-warning predictions for catastrophic physiological events like epileptic seizures or cardiac arrhythmias, solving the problem of late detection based on lagging indicators. Autonomous Systems and Robotics: The Manifold Optimizer and Pattern Evolution components can be used to continuously optimize control algorithms for drones or robots operating in chaotic, unpredictable environments, solving the problem of static control systems that cannot adapt to novel conditions in real-time. Scientific Computing and Simulation: The system can analyze the data output from complex simulations (e.g., climate models, fluid dynamics) to identify points of instability, predict regime changes, or optimize simulation parameters for faster convergence, solving the problem of inefficient exploration of vast parameter spaces. Industrial IoT and Predictive Maintenance: By analyzing sensor data from machinery, the system can predict component failure with greater accuracy than traditional methods by detecting subtle degradation in the data stream's "coherence" long before physical symptoms appear.

**[0024]** Also, it can create: Yes. The invention can be embodied in several forms: A Hardware Co-processor: The algorithms can be implemented on a specialized hardware device, such as an FPGA or ASIC, to create a high-throughput "coherence processor" that can be integrated into servers, network appliances, or embedded systems. A Software Development Kit (SDK): It can be packaged as a C++ library or SDK, allowing developers in various industries to integrate its quantum-inspired analytical and optimization capabilities into their own applications. A Turnkey Analytical Appliance: The invention can be delivered as a complete hardware and software system (a server appliance) for a specific task, such as a real-time trading/risk management workstation or a network security monitoring box. Novel Data Compositions: The Pattern Evolution engine itself produces a useful output: optimized, evolved financial patterns or trading strategies. These strategies, being novel and non-obvious compositions of data, can be licensed or sold as distinct intellectual property products.

**Abstract**

This invention is a financial modeling system that treats data as a quantum field, using novel algorithms to analyze bit-level transitions for predicting pattern collapse and applying Riemannian geometry to evolve and optimize these financial patterns for predictive accuracy. It is a comprehensive system that integrates quantum-inspired analytics with evolutionary computation to create a self-optimizing engine for financial trading and risk management. My invention solves these problems through its unique, integrated architecture. It eliminates pattern recognition lag by using the QFH and QBSA modules to analyze data at the bit-level and predict pattern degradation and collapse before it happens, shifting from a reactive to a predictive model. It overcomes the "black box" problem by using a mathematically transparent framework based on quantum mechanics and Riemannian geometry, providing clear, interpretable reasons for its predictions. The Quantum Manifold Optimizer directly solves the issue of suboptimal solutions by navigating the complex, curved, non-linear space of financial patterns to find globally optimal strategies that traditional methods miss. Lastly, the Pattern Evolution System solves the problem of static, outdated models by treating financial patterns as evolving entities that automatically adapt and improve themselves based on their historical performance, ensuring the system remains effective in constantly changing markets.