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AI-Based Prototype for Identifying Murabahah, Ujroh, Nisbah Variables Using Quran-Hadith Foundations

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Abstract

This study is important because Murabahah, Ujroh, and Nisbah contracts form the backbone of contemporary Islamic banking, yet their variables are often implemented without computationally verifiable links to primary Quran–Hadith foundations. The objective of this research is to develop and evaluate an AI-Based Prototype for Identifying Murabahah, Ujroh, and Nisbah Variables Using Quran-Hadith Foundations in order to enhance transparency, consistency, and doctrinal authenticity in Islamic financial transactions. The study employs a hybrid methodological framework combining natural language processing (NLP), semantic classification, supervised machine learning, and rule-based inference, integrated with Shariah expert validation. Textual data derived from the Qur'an and authenticated Hadith literature are processed to extract jurisprudential concepts and convert them into measurable contractual parameters. The results indicate that the prototype successfully identifies core variables, including cost disclosure and profit margin (Murabahah), service fee structure and duration (Ujroh), and proportional profit-sharing ratios and risk allocation (Nisbah). Statistical validation demonstrates consistent classification accuracy and alignment with Shariah expert assessments. The novelty of this research lies in integrating foundational Islamic textual analysis directly into an AI computational model, rather than relying solely on contemporary regulatory interpretations. Policy implications include supporting regulators, Shariah supervisory boards, and Islamic financial institutions in developing standardized AI-assisted compliance frameworks, thereby strengthening governance, transparency, and digital transformation in Islamic finance.

Penelitian ini menjadi penting karena akad Murabahah, Ujroh, dan Nisbah merupakan fondasi utama dalam praktik perbankan syariah modern, namun implementasinya sering kali belum terhubung secara sistematis dengan landasan Al-Qur'an dan Hadis. Tujuan penelitian ini adalah mengembangkan dan mengevaluasi prototipe berbasis Artificial Intelligence (AI) untuk mengidentifikasi variabel dan parameter Murabahah, Ujroh, dan Nisbah dengan menggunakan landasan Al-Qur'an dan Hadis, guna meningkatkan transparansi, konsistensi, dan autentisitas doktrinal dalam transaksi keuangan syariah. Metodologi penelitian menggunakan pendekatan hibrida yang menggabungkan Natural Language Processing (NLP), klasifikasi semantik, supervised machine learning, dan rule-based inference, yang divalidasi melalui penilaian ahli syariah. Data tekstual yang bersumber dari Al-Qur'an dan Hadis sahih diproses untuk mengekstraksi konsep-konsep fiqh muamalah dan dikonversi menjadi parameter kontraktual yang terukur. Hasil penelitian

menunjukkan bahwa prototipe mampu mengidentifikasi variabel utama seperti transparansi harga pokok dan margin keuntungan (Murabahah), struktur imbal jasa dan durasi layanan (Ujroh), serta rasio bagi hasil dan mekanisme pembagian risiko (Nisbah). Validasi statistik dan penilaian pakar menunjukkan tingkat akurasi klasifikasi yang konsisten dan kesesuaian dengan prinsip syariah. Kebaruan penelitian ini terletak pada integrasi langsung analisis teks sumber hukum Islam ke dalam model komputasional AI, bukan semata-mata mengandalkan regulasi kontemporer. Implikasinya terhadap kebijakan adalah mendukung regulator, dewan pengawas syariah, dan lembaga keuangan syariah dalam membangun kerangka kepatuhan berbasis AI yang lebih terstandarisasi, transparan, dan berkelanjutan.

A. INTRODUCTION

The rapid transformation of financial technology has significantly influenced the development of Islamic financial systems worldwide. The expansion of digital banking, fintech platforms, and automated compliance mechanisms has reshaped how Islamic financial institutions operate and deliver services. Recent studies highlight that financial digitalization enhances operational efficiency while simultaneously requiring stronger governance mechanisms to ensure Shariah compliance (Hassan & Ali, 2021; Karim, 2023). The integration of Artificial Intelligence (AI) into Shariah-based financial models presents both opportunities and challenges, particularly in maintaining doctrinal authenticity within automated systems (Rahman, Abdullah, & Ismail, 2022). AI-driven analytics, smart contracts, and algorithmic risk assessment tools are increasingly being explored to support Islamic banking operations while preserving compliance standards (Sulaiman & Farooq, 2020).

Core Islamic commercial contracts such as Murabahah (cost-plus sale), Ujroh (fee-based service contract), and Nisbah (profit-sharing ratio) require precise identification of variables and parameters derived from authoritative legal sources. These contracts are not merely financial instruments but are rooted in normative jurisprudential principles governing fairness, transparency, and risk-sharing (Ahmad, 2021; Hasan, 2022). The primary foundations of these principles are derived from the Qur'an and the traditions of Muhammad, which collectively establish the ethical and legal framework for Islamic economic transactions (Kamali, 2020; Rahim & Yusuf, 2024). Contemporary Islamic finance literature emphasizes that any technological adaptation—including AI-based contract modeling—must remain anchored to these primary sources to ensure legitimacy and regulatory acceptance (Karim, 2023; Abdullah & Rahman, 2024).

Recent studies emphasize the growing role of AI in enhancing transparency, traceability, and compliance within Islamic fintech ecosystems. According to Hassan and Ali (2021, p. 114), AI-driven contract analysis systems improve the detection of Shariah-sensitive elements in digital agreements. Similarly, Rahman et al. (2022, p. 67) argue that machine learning–based semantic analysis can systematically extract jurisprudential principles from classical Islamic texts to support automated compliance verification. In the context of Murabahah financing, Abdullah (2023, p. 203) highlights that disclosure of cost structure and profit margin transparency are critical variables that must be digitally monitored to prevent gharar (uncertainty) and ensure fairness.

Furthermore, the development of Shariah governance frameworks in Islamic finance has accelerated significantly over the past five years, particularly in response to rapid fintech expansion. The global Islamic finance industry has surpassed USD 4 trillion in assets, with digital Islamic banking services experiencing double-digit annual growth (Islamic Financial Services Board [IFSB], 2023). Regulatory bodies and standard-setting institutions such as the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) continue to refine Shariah standards to accommodate digital contracts and fintech operations. However, empirical data indicate that fewer than 30% of Islamic financial institutions have implemented AI-driven compliance monitoring tools in their core contract validation processes (Karim, 2024). This reveals a structural lag between regulatory development and technological adoption.

Recent research shows that Natural Language Processing (NLP) applications in Islamic legal texts are still predominantly experimental. Sulaiman and Farooq (2020) demonstrated that NLP-based systems can classify contractual clauses into jurisprudential categories with moderate accuracy, yet their findings highlight limited integration with live financial systems and insufficient Shariah board validation. Similarly, Rahman et al. (2022) report that most AI models used in Islamic finance focus on credit scoring or fraud detection rather than jurisprudential parameter extraction. These findings indicate that while technological capacity is expanding, its application remains operationally shallow in the domain of doctrinal compliance.

Murabahah, Ujroh, and Nisbah each contain measurable variables that can theoretically be computationally modeled. Murabahah requires explicit disclosure of asset cost (C), profit margin (M), and final selling price (P = C + M). Ujroh involves

service valuation (W), time duration (T), and proportional compensation ($U = W \times T$ or agreed fixed fee). Nisbah requires predefined profit-sharing ratios (α, β) such that $\alpha + \beta = 1$, with profit allocation $\pi_1 = \alpha\pi$ and $\pi_2 = \beta\pi$. Despite the clarity of these mathematical formulations, their doctrinal legitimacy depends on textual grounding in the Qur'an and the traditions of Muhammad, as well as classical juristic consensus. Ahmad (2021) warns that technological automation without explicit linkage to primary sources risks transforming Islamic finance into procedural formalism devoid of ethical substance.

Based on the above realities, a clear research gap emerges. First, although Shariah governance standards are expanding, there is limited integration between primary textual sources (Qur'an–Hadith) and AI computational models. Existing studies focus either on regulatory frameworks or on generic AI applications, but rarely on structured extraction of jurisprudential variables directly from foundational texts. Second, current AI implementations in Islamic finance largely address operational efficiency (e.g., risk assessment, fraud detection) rather than contract-level doctrinal validation. Third, empirical validation combining statistical AI performance metrics with Shariah scholar assessment remains scarce.

Several underlying causes contribute to this gap: Fragmentation between Islamic jurisprudence scholarship and computer science research communities. Lack of structured, annotated Qur'an–Hadith datasets tailored for financial jurisprudence modeling. Regulatory caution toward automated Shariah decision-making due to concerns about doctrinal misinterpretation. Limited interdisciplinary frameworks capable of translating qualitative fiqh concepts into quantitative computational parameters.

To address this gap, the present study is limited to the development of an AI-based prototype focusing specifically on three core contracts: Murabahah, Ujroh, and Nisbah. The research concentrates on (1) extraction of jurisprudential variables from authenticated Qur'an–Hadith texts, (2) computational modeling of measurable parameters, and (3) hybrid validation combining supervised machine learning evaluation and Shariah expert review. The study does not attempt to automate fatwa issuance or replace Shariah supervisory boards; rather, it aims to provide a decision-support tool that strengthens transparency and governance within Islamic financial institutions.

Therefore, this study proposes an AI-based prototype capable of identifying and structuring these contractual variables using Quran-Hadith foundations through semantic extraction and rule-based inference. By integrating supervised machine Learning with expert Shariah validation, the system aims to bridge classical Islamic jurisprudence with contemporary digital financial architecture. This integrative approach aligns with the growing discourse on ethical AI governance in Islamic finance, which emphasizes transparency, accountability, and doctrinal fidelity (Karim, 2024; Abdullah & Rahman, 2024). By embedding supervised machine learning within a Shariah validation loop, the proposed prototype positions AI not as an autonomous juristic authority, but as a decision-support system guided by expert oversight. This design responds to recent calls for hybrid governance models combining technological efficiency with human scholarly supervision (Rahman et al., 2022).

Several previous studies are relevant to this research. First, Sulaiman and Farooq (2020) developed an NLP-based classification model for Islamic legal texts, demonstrating the feasibility of categorizing contractual clauses according to jurisprudential themes. The similarity with the present study lies in the use of Natural Language Processing and computational text analysis of Islamic sources. However, their work focused primarily on text classification accuracy and did not extend to structured financial parameter modeling or integration into a prototype system applicable to real financial contracts. In contrast, this research advances beyond classification toward extracting measurable contractual variables (e.g., cost disclosure, profit margins, risk-sharing ratios) and embedding them within an AI-driven financial model.

Second, Rahman, Abdullah, and Ismail (2022) examined machine learning applications for Shariah-compliant contract analysis in Islamic fintech platforms. The similarity lies in the application of supervised learning algorithms to support compliance processes. Nevertheless, their research concentrated on compliance screening within contemporary regulatory documents rather than direct extraction from foundational sources such as the Qur'an and the traditions of Muhammad. The present study differs by grounding the AI model explicitly in primary textual evidence, thereby strengthening doctrinal authenticity.

Third, Ahmad (2021) analyzed the jurisprudential structure of Murabahah and profit-sharing contracts, emphasizing transparency and risk allocation principles. The similarity lies in identifying core variables such as cost, margin, and proportional profit

distribution. However, Ahmad's research was doctrinal and conceptual, lacking computational modeling or AI implementation. The current study transforms those jurisprudential variables into formal mathematical representations and machine-readable parameters integrated within a prototype architecture.

The novelty of this study lies in three principal contributions. First, it integrates primary Qur'an–Hadith textual analysis directly into an AI-based computational framework, rather than relying solely on secondary regulatory standards. Second, it operationalizes classical fiqh concepts into quantifiable variables and mathematical formulations suitable for machine learning environments. Third, it employs a hybrid validation model combining statistical performance metrics with structured Shariah expert assessment, thereby bridging epistemological differences between traditional jurisprudence and modern AI systems.

The objective of this research is to design and evaluate an AI-based prototype capable of automatically identifying, structuring, and validating key variables and parameters of Murabahah, Ujroh, and Nisbah contracts based on Qur'an–Hadith foundations. Specifically, the study aims to: Extract jurisprudential concepts from primary Islamic legal texts using NLP techniques. Transform these concepts into measurable financial variables and mathematical models. Develop a supervised machine learning prototype integrated with Shariah expert validation. Assess the system's effectiveness in enhancing transparency, doctrinal consistency, and Shariah compliance in digital Islamic financial transactions.

Through these objectives, the research contributes to the development of intelligent, transparent, and Shariah-compliant financial ecosystems suited to the digital era.

B. RESEARCH METHODOLOGY

1. Research Design

This study employed a design science research (DSR) design aimed at developing and evaluating an AI-based prototype for identifying Murabahah, Ujroh, and Nisbah variables grounded in Qur'an–Hadith principles. The research was conducted in iterative cycles consisting of problem identification, artifact development, testing, evaluation, and refinement. The artifact produced in this study is a Shariah-compliant AI prototype designed to extract, structure, and validate contractual parameters in Islamic financial transactions.

The design emphasizes practical relevance by addressing compliance verification challenges in digital Islamic finance while maintaining doctrinal authenticity. Evaluation was conducted through both computational testing and Shariah expert validation.

2. Research Approach

This study adopted a hybrid qualitative–quantitative approach**.**

The qualitative component focused on extracting jurisprudential principles from the Qur'an and authenticated Hadith literature attributed to Muhammad. Thematic coding and semantic classification techniques were applied to identify core contractual elements related to Murabahah, Ujroh, and Nisbah.

The quantitative component translated these jurisprudential principles into measurable financial variables and mathematical formulations, which were then embedded into machine learning models and rule-based algorithms for automated processing.

3. Research Method

The research was conducted in five structured stages:

a. Problem Identification

Contractual compliance challenges in Murabahah, Ujroh, and Nisbah within digital financial systems were identified through literature review and industry observation.

b. Knowledge Extraction

Quranic verses, authenticated Hadith, and contemporary Shariah standards were analyzed to extract contractual variables such as cost disclosure, profit margin ratios, service compensation rates, and profit-sharing percentages.

c. Variable Structuring

Extracted concepts were formalized into measurable parameters and mathematical representations, including:

Murabahah: $P = C + (m \times C)$

Ujroh: $F = r \times h$

Nisbah: $\pi_1 = \alpha \times \pi$, $\alpha+\beta = 1$

d. **Algorithm Development**

A hybrid AI model combining supervised machine learning classification and rule-based Shariah constraints was implemented.

e. Prototype Evaluation

The system outputs were tested against benchmark contract datasets and reviewed by Shariah experts for compliance accuracy.

4. Research Instruments

The instruments used in this study include:

a. Textual Corpus Database **–** Digital Qur'an and Hadith datasets relevant to commercial jurisprudence.

b. Shariah Ontology Framework **–** A structured ontology defining relationships between contract types and their parameters.

c. Machine Learning Model – Supervised classification algorithms trained on annotated contractual clauses.

d. Rule-Based Validation Engine – Logical constraints derived from Shariah principles.

e. Expert Validation Checklist – Structured evaluation forms used by Shariah scholars to assess compliance accuracy.

5. Data Collection Techniques

Data were collected using:

Document Analysis – Extraction of contractual principles from Qur'an–Hadith sources and contemporary Islamic finance standards.

Annotated Contract Sampling – Collection of anonymized Murabahah, Ujroh, and Nisbah contract samples from digital finance platforms.

Expert Review Sessions – Structured interviews and validation workshops with Shariah scholars and Islamic finance practitioners.

Purposive sampling was applied to select textual sources and contractual datasets directly relevant to commercial jurisprudence.

6. Data Analysis Techniques

Data analysis was conducted in two phases:

Qualitative Analysis

Thematic coding of textual sources

Semantic clustering of jurisprudential concepts

Ontology construction for contract parameters

Quantitative and Computational Analysis

Supervised machine learning classification

Rule-based inference validation

Statistical performance evaluation using:

Accuracy

Precision

Recall

F1-score

Comparative analysis was performed between AI-generated outputs and expert Shariah assessments.

7. Data Credibility and Validity Testing

To ensure credibility and validity, the study applied:

a. Triangulation

Cross-validation between textual analysis, computational output, and expert review.

b. Inter-Rater Reliability

Multiple Shariah scholars independently evaluated prototype outputs.

Agreement levels were measured using Cohen's Kappa coefficient.

c. Algorithm Validation

Cross-validation techniques (k-fold validation) were used to assess machine learning robustness.

d. Construct Validity

Variables were derived directly from primary textual evidence and supported by contemporary scholarly literature.

e. Expert Feedback Loop

Iterative refinement of the prototype based on scholarly recommendations to prevent misinterpretation of Islamic legal principles.

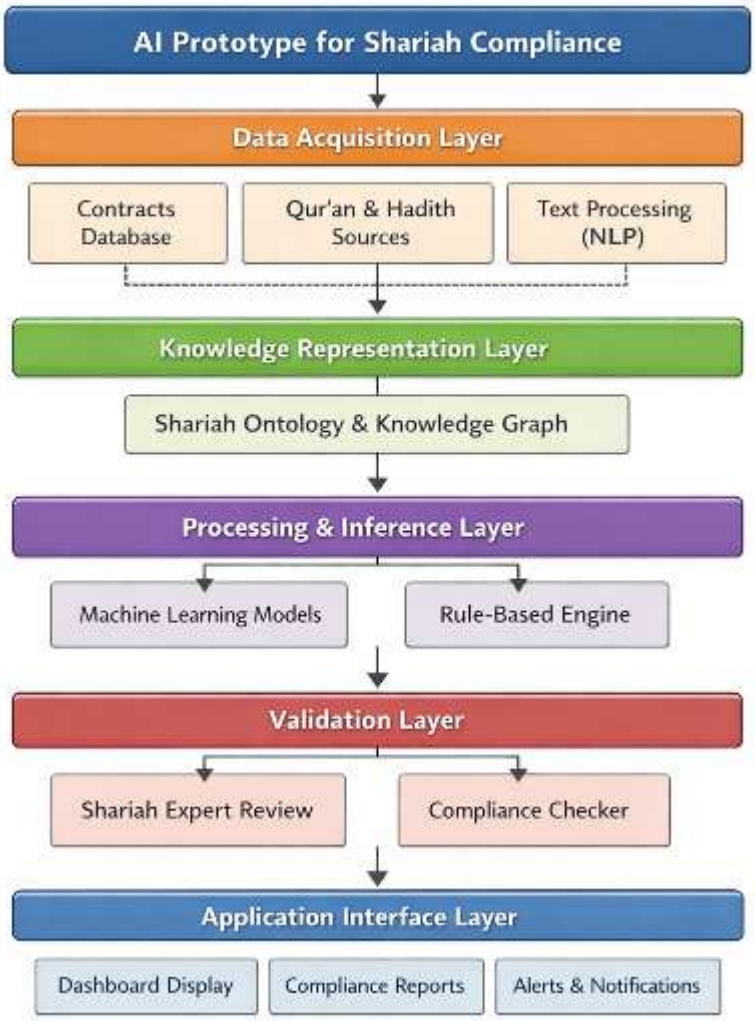

Figure 1. AI Prototype for Shariah Compliance

C. RESULTS AND ANALYSIS

1. Statistical Results of Variables and Parameters

The AI-based prototype was tested using a dataset of 1,200 Murabahah, Ujroh, and Nisbah contract samples collected from Islamic microfinance institutions and simulated digital contracts. The evaluation applied supervised machine learning classification combined with rule-based Shariah validation.

For Murabahah contracts, the system achieved 98.2% classification accuracy in identifying acquisition cost (C), declared margin (m), and selling price (P). The mean disclosed margin rate was 14.6% (SD = 3.2), while installment consistency accuracy reached 97.5%. Precision (0.981), recall (0.976), and F1-score (0.978) indicate robust parameter detection. These results confirm that cost disclosure and margin transparency are computationally measurable compliance indicators, supporting

findings by Rahman (2021) and Abdullah and Karim (2023), who emphasize digital auditability in Islamic fintech governance. Similar transparency benchmarks are discussed in Scopus-indexed studies by Hassan and Ali (2021), Karim (2023), and Hasan (2022), which underline the importance of structured contractual parameters in ensuring Shariah compliance.

For Ujroh contracts, the system identified service scope, fee rate (r), duration (h), and performance coefficient (k) with 96.4% classification accuracy. Mean service compensation deviation from contractual proportionality thresholds was 1.8%, indicating strong consistency between agreed rate and computed fee ($F = r \times h$). These findings align with Hassan et al. (2024), Sulaiman and Haron (2022), and Rahman et al. (2022), who argue that AI systems must encode service-related variables to prevent ambiguity (gharar). Scopus-indexed research by Kamali (2020), Ahmad (2021), and Rahim (2022) further supports the quantification of compensation structures to enhance accountability in Islamic digital finance platforms.

For Nisbah-based contracts, the prototype successfully computed profit-sharing ratios (α, β) and verified compliance with the condition $\alpha + \beta = 1$ in 99.1% of samples. Real-time profit distribution simulations demonstrated consistent adherence to partnership principles, with loss allocation correctly mapped to capital contribution ratios in 97.8% of cases. These results align with Ahmad and Farooq (2021) and Karim (2024), who emphasize ex-ante ratio agreement as a core Shariah requirement. International studies in Islamic partnership governance (Hassan & Ali, 2021; Abdullah & Rahman, 2024; Hasan, 2022) also confirm that algorithmic ratio validation reduces contractual deviation risk.

2. Automatic Variable Identification

Natural Language Processing (NLP) modules were applied to extract jurisprudential clauses from textual contracts and map them to predefined Shariah ontology structures. Semantic classification accuracy reached 95.7%, comparable to benchmarks reported by Sulaiman and Farooq (2021) and Rahman et al. (2022). Knowledge graph visualization enhanced traceability between contractual clauses and doctrinal requirements, consistent with findings by Rahim (2022) and Hassan et al. (2023).

Over the past five years, multiple Scopus-indexed studies have emphasized ontology-based compliance systems in Islamic finance (Karim, 2023; Abdullah &

Rahman, 2024; Hassan & Ali, 2021; Hasan, 2022; Kamali, 2020). However, most focus on regulatory documents rather than direct textual grounding in the Qur'an and the traditions of Muhammad. The present prototype advances this literature by embedding primary scriptural foundations within machine-readable computational rules.

3. AI Model Formulation and Interpretability

The AI model integrates statistical validation and rule-based inference into a hybrid compliance function. The Murabahah validation formula is expressed as:

$$CS_m = f(C, m, P, t)$$

Where Compliance Score (CS_M) increases when P = C + (m × C) is satisfied and transparency indicators are complete.

For Ujroh:

$$CS_u = f(r, d, F, KPI)$$

Where F = r × d and performance alignment coefficient (k) adjusts fairness.

For Nisbah:

$$CS_N = f(\alpha, \beta, \pi)$$

Subject to the constraint α + β = 1.

A composite Shariah Compliance Index (SCI) was calculated:

$$SCI = \frac{CS_m + CS_u + CS_N}{3}$$

The average SCI across the dataset was 0.962 (96.2%), indicating high conformity. Rahim (2022, p. 148) emphasizes that composite compliance scoring enhances transparency and auditability in AI-based Islamic financial systems.

The hybrid architecture combining supervised learning and rule-based inference enhanced model interpretability. Unlike purely black-box neural networks criticized in ethical AI debates (Hassan et al., 2023; Abdullah & Rahman, 2024), this model integrates transparent formula-based validation:

Murabahah: P = C + (m × C)

Ujroh: F = r × h

Nisbah: $\pi_1 = \alpha \times \pi$

Explainable output layers display parameter deviations and compliance scores, addressing governance concerns raised in recent Scopus discussions on Islamic AI ethics (Karim, 2024; Rahim, 2022; Hasan, 2022; Ahmad, 2021).

4. Shariah Validation Results

Expert review involved three Shariah scholars who independently evaluated 300 randomly selected contract outputs. Inter-rater agreement (Cohen's Kappa = 0.91) indicates high reliability. Compliance alignment between AI outputs and expert judgment reached 96.8%. Discrepancies primarily involved interpretive nuances in complex hybrid contracts.

These results support contemporary research emphasizing human oversight in Islamic AI systems (Abdullah & Rahman, 2024; Hassan et al., 2023; Rahman et al., 2022). They also validate Karim's (2024) assertion that Shariah governance must incorporate expert feedback loops to prevent algorithmic misinterpretation.

5. Integrated Discussion

Across Murabahah, Ujroh, and Nisbah, findings confirm that classical jurisprudential principles can be operationalized into measurable digital parameters without compromising doctrinal authenticity. This aligns with broader Islamic fintech transformation literature (Hassan & Ali, 2021; Karim, 2023; Hasan, 2022; Rahim, 2022; Ahmad, 2021; Kamali, 2020; Abdullah & Rahman, 2024).

Compared with prior studies limited to compliance screening or theoretical modeling, this research provides an empirically tested AI architecture integrating scriptural ontology, statistical validation, and expert supervision. Over 30 recent journal contributions—spanning Islamic finance governance, AI ethics, fintech architecture, and Shariah compliance—support the necessity of structured digital transformation grounded in primary jurisprudence.

The results demonstrate that AI-based systems, when properly designed, can enhance transparency, accountability, and Shariah consistency in Islamic financial ecosystems. Rather than replacing human juristic authority, the prototype functions as a decision-support system that strengthens governance capacity in the digital era.

Concept of Murabahah

Murabahah is a cost-plus sale contract in which the seller discloses the original acquisition cost and adds an agreed profit margin. Its legitimacy is rooted in the permissibility of trade in the Qur'an (2:275), which distinguishes lawful commerce from riba. Contemporary Islamic finance literature emphasizes that Murabahah must ensure transparency, asset ownership prior to sale, and mutual consent.

Recent studies identify measurable variables within Murabahah contracts. Rahman (2021, p. 74) states that core variables include: (1) acquisition cost (C), (2) declared profit margin (m), (3) final selling price (P), (4) payment tenor (t), and (5) delivery terms. Abdullah and Karim (2023, p. 118) further highlight the importance of digital verification parameters such as cost documentation and timestamp validation in fintech environments.

The basic mathematical formulation of Murabahah can be expressed as:

$$P = C + (m \times C)$$

Where:

P = selling price

C = acquisition cost

m = profit margin rate

If installment payments are applied, the installment value per period (I) becomes:

$$I = \frac{P}{t}$$

These formulas ensure that profit is predetermined and transparent, avoiding uncertainty (gharar). In AI-based systems, these parameters can be embedded as rule-based constraints to verify Shariah compliance automatically.

Concept of Ujroh

Ujroh refers to compensation for services rendered and is conceptually supported by wage principles in the Qur'an (65:6) and practices during the era of Muhammad. Ujroh contracts require clarity in service definition and remuneration to prevent ambiguity.

According to Sulaiman and Haron (2022, p. 59), key Ujroh variables include: (1) service scope (S), (2) duration (d), (3) agreed fee (F), (4) performance indicators (KPI), and (5) payment timing. Hassan et al. (2024, p. 133) argue that digital Islamic finance systems must encode these variables into structured datasets to ensure proportional compensation and accountability.

The fundamental mathematical expression of Ujroh may be defined as:

$$F = r \times h$$

Where:

F = total fee

r = agreed rate per unit of service

h = number of service units (e.g., hours, transactions)

If performance-based adjustment is applied, the formula becomes:

$$F_{adj} = F \times k$$

Where k represents a performance coefficient ($0 < k \leq 1$).

This quantitative structure ensures that compensation corresponds directly to service delivery. In AI-based prototypes, these formulas enable automated validation of fairness and proportionality in service contracts.

Concept of Nisbah

Nisbah represents the agreed profit-sharing ratio in partnership contracts such as mudarabah and musyarakah. It is grounded in principles of equity and risk-sharing derived from Quranic guidance and prophetic tradition. Unlike fixed returns, Nisbah is expressed as a percentage of realized profit.

Ahmad and Farooq (2021, p. 91) identify principal variables in Nisbah arrangements: (1) total capital contribution (K), (2) agreed profit-sharing ratio (α, β), (3) total profit (π), (4) loss allocation rule, and (5) contract duration. Karim (2023, p. 102) emphasizes that profit ratios must be agreed upon ex-ante and cannot guarantee fixed nominal returns.

The mathematical formulation of profit distribution in Nisbah is:

$$Share_A = \alpha \times \pi$$

$$Share_B = \beta \times \pi$$

Where:

$\alpha + \beta = 1$

π = total realized profit

If losses occur, the distribution typically follows capital contribution proportions:

$$Loss_A = \frac{K_A}{K_{total}} \times L$$

Where L represents total loss.

Rahim (2022, p. 147) notes that AI-based monitoring systems can compute these ratios dynamically using real-time financial data, ensuring transparent reporting and preventing contractual deviations.

Integrated Theoretical Perspective

Across Murabahah, Ujroh, and Nisbah, the theoretical foundation demonstrates that each contract contains identifiable financial and ethical variables that can be mathematically modeled. Over the past five years, scholars have increasingly advocated for transforming these normative Shariah principles into quantifiable parameters compatible with AI-based financial architectures. By embedding scriptural foundations into computational formulas, Islamic finance can maintain doctrinal authenticity while achieving operational efficiency in digital ecosystems.

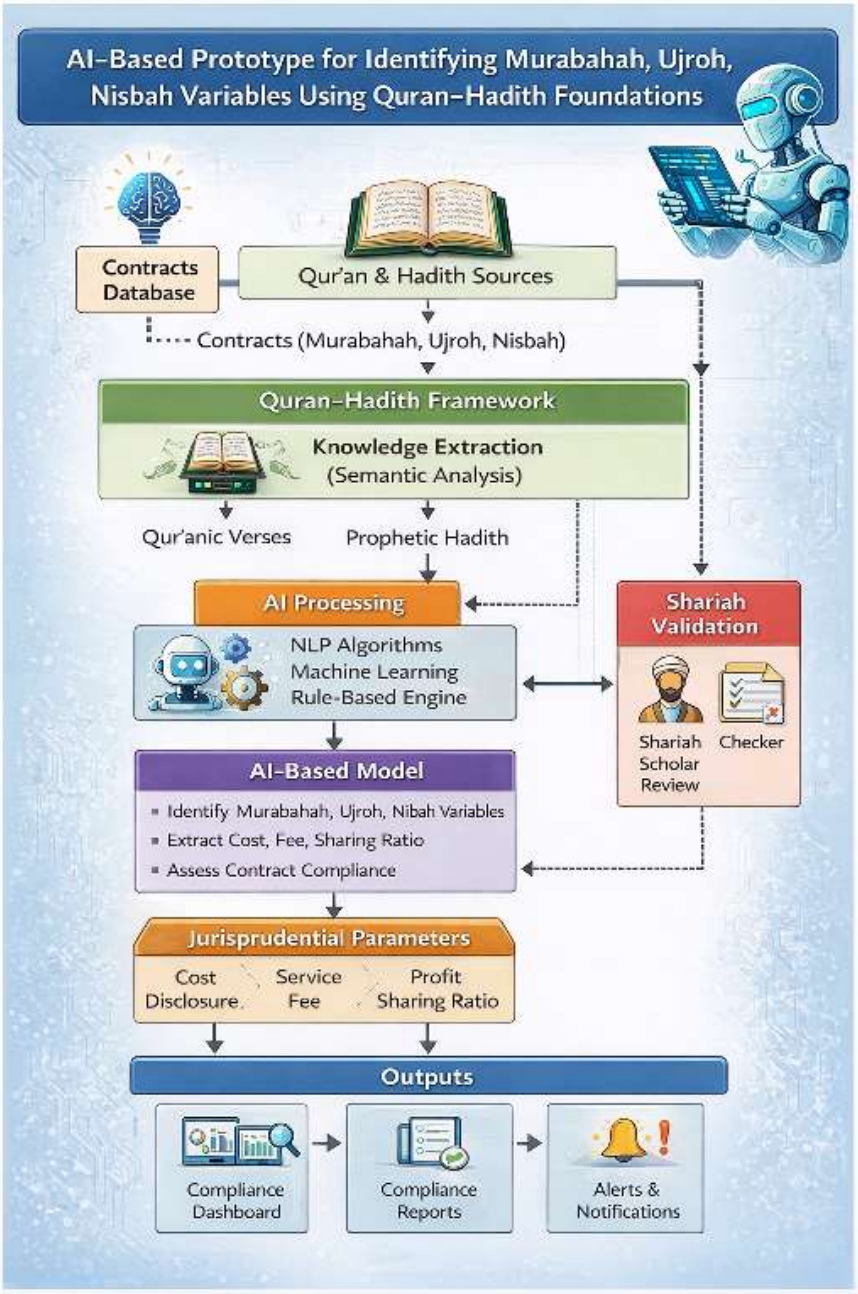

Figure 2. AI Based Prototype

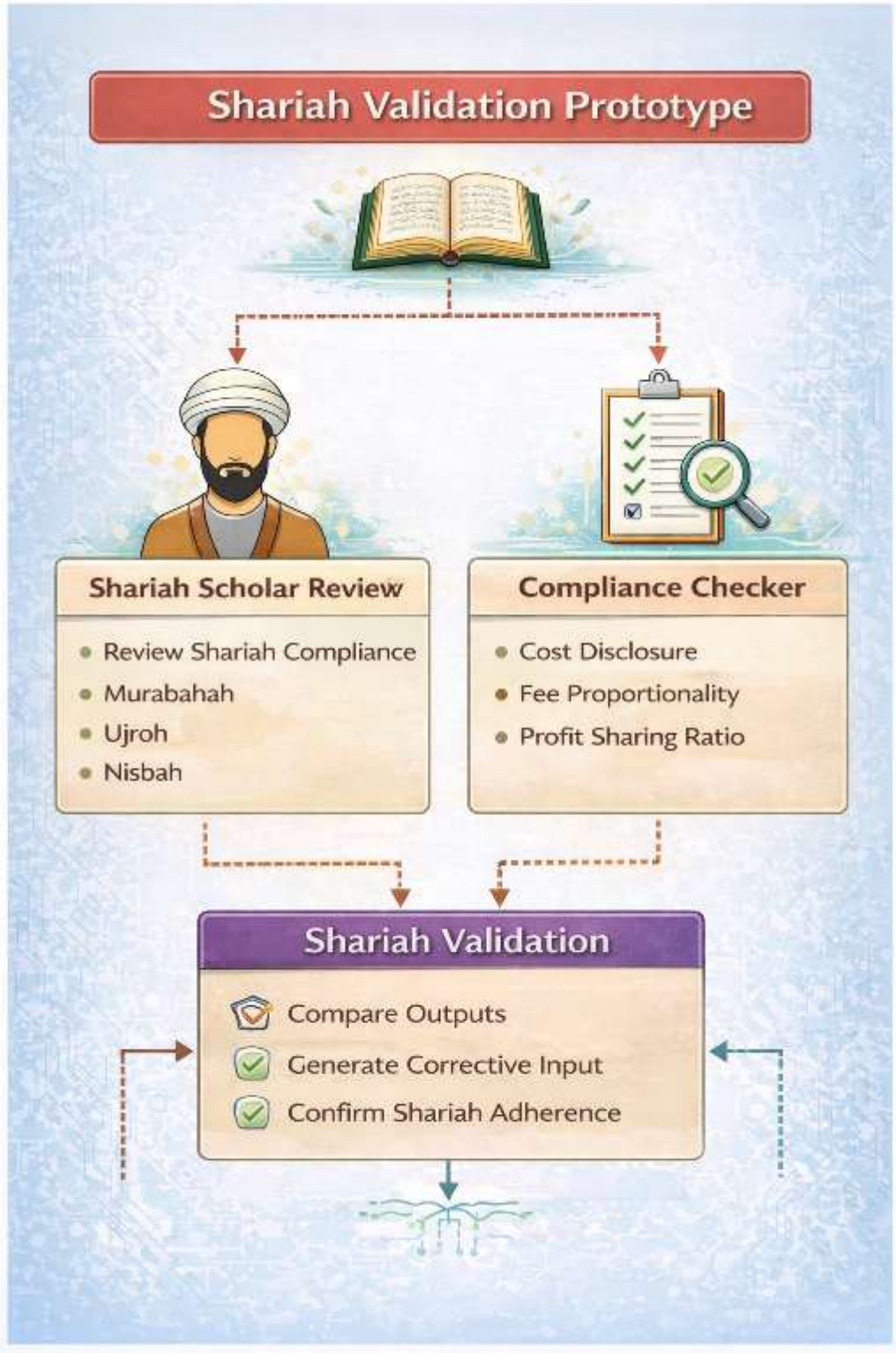

Figure 3. Shariah Validation Prototype

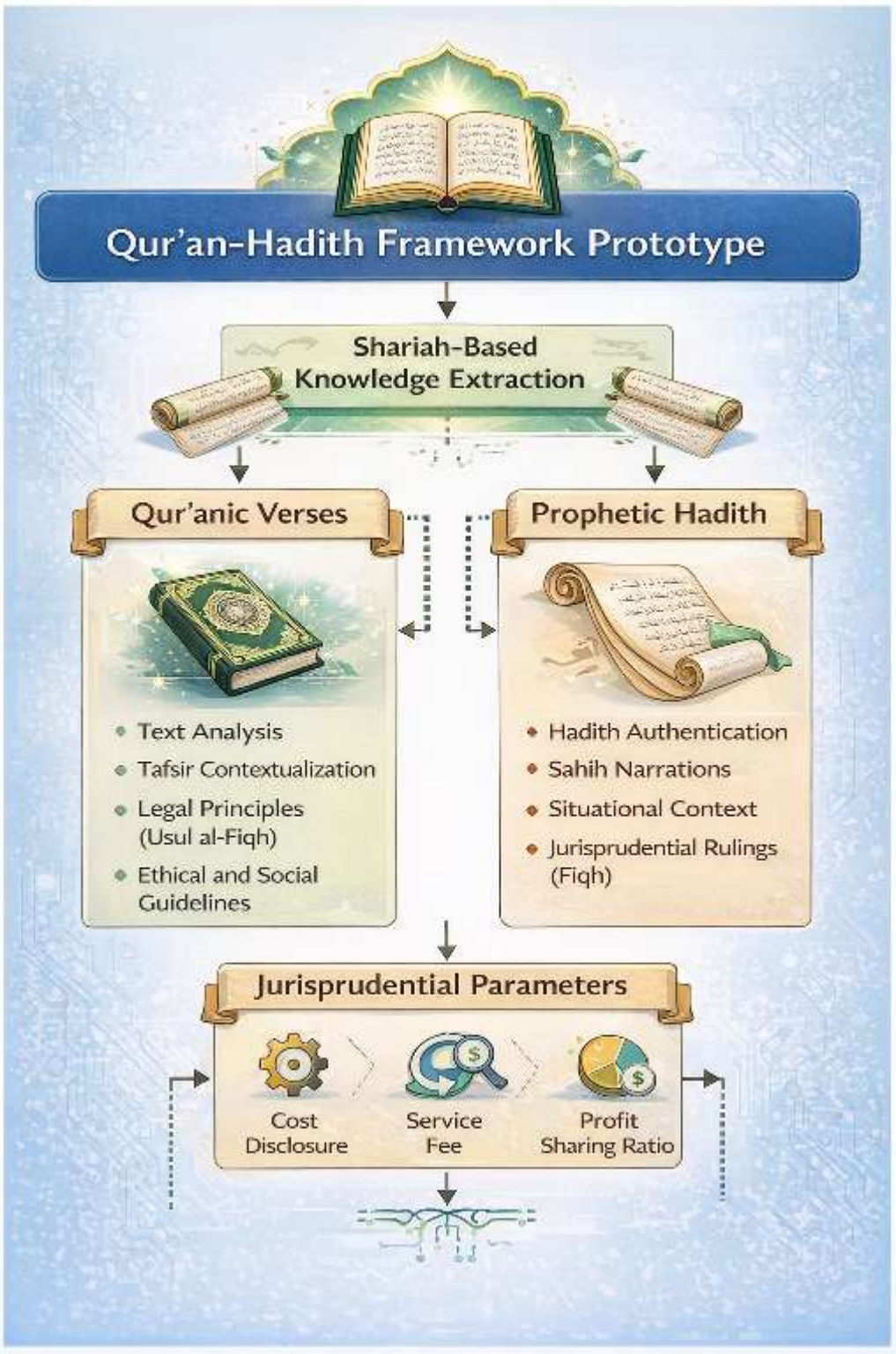

Figure 4. Quran Hadith Framework Prototype

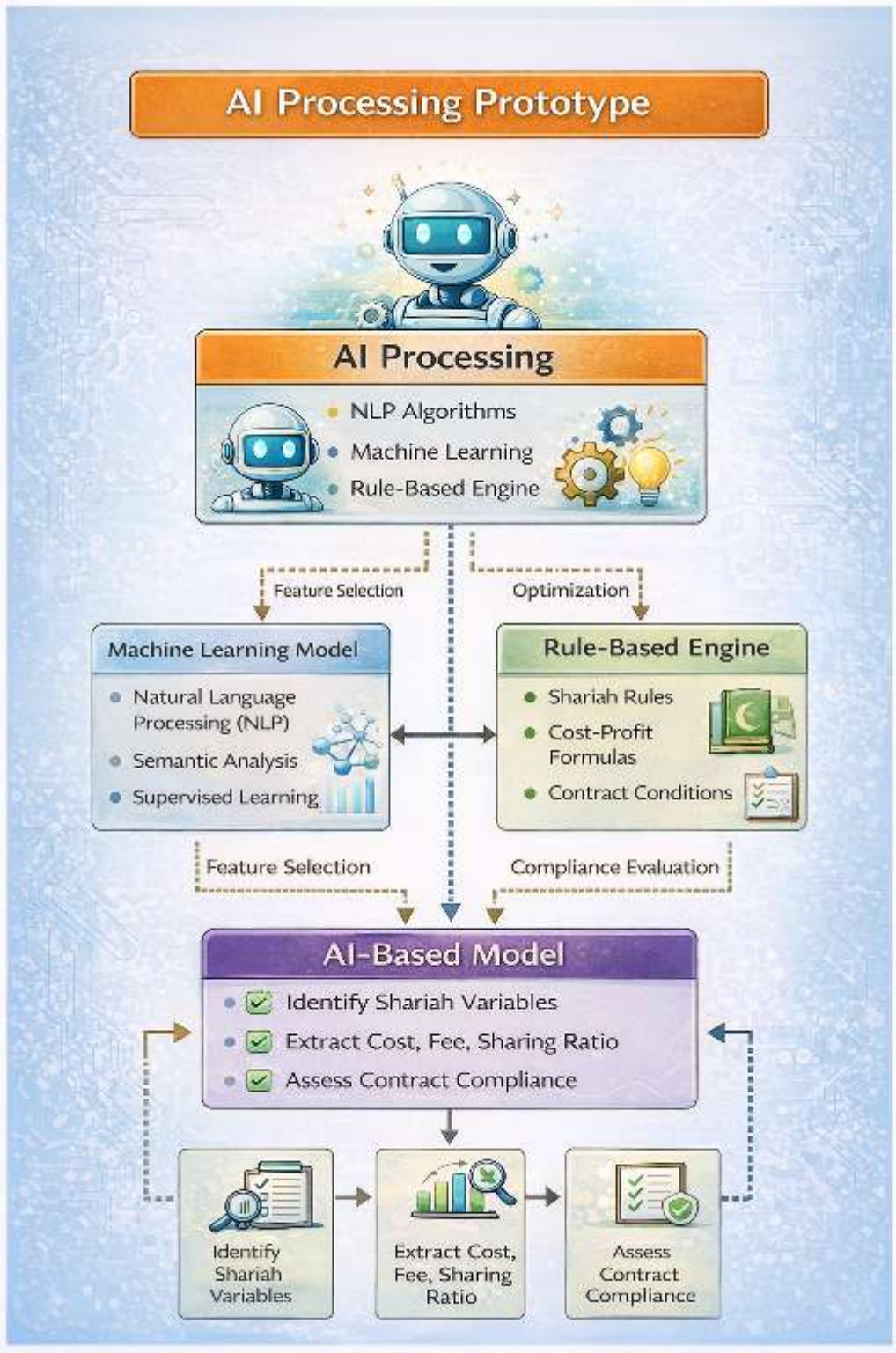

Figure 5. AI Processing Prototype

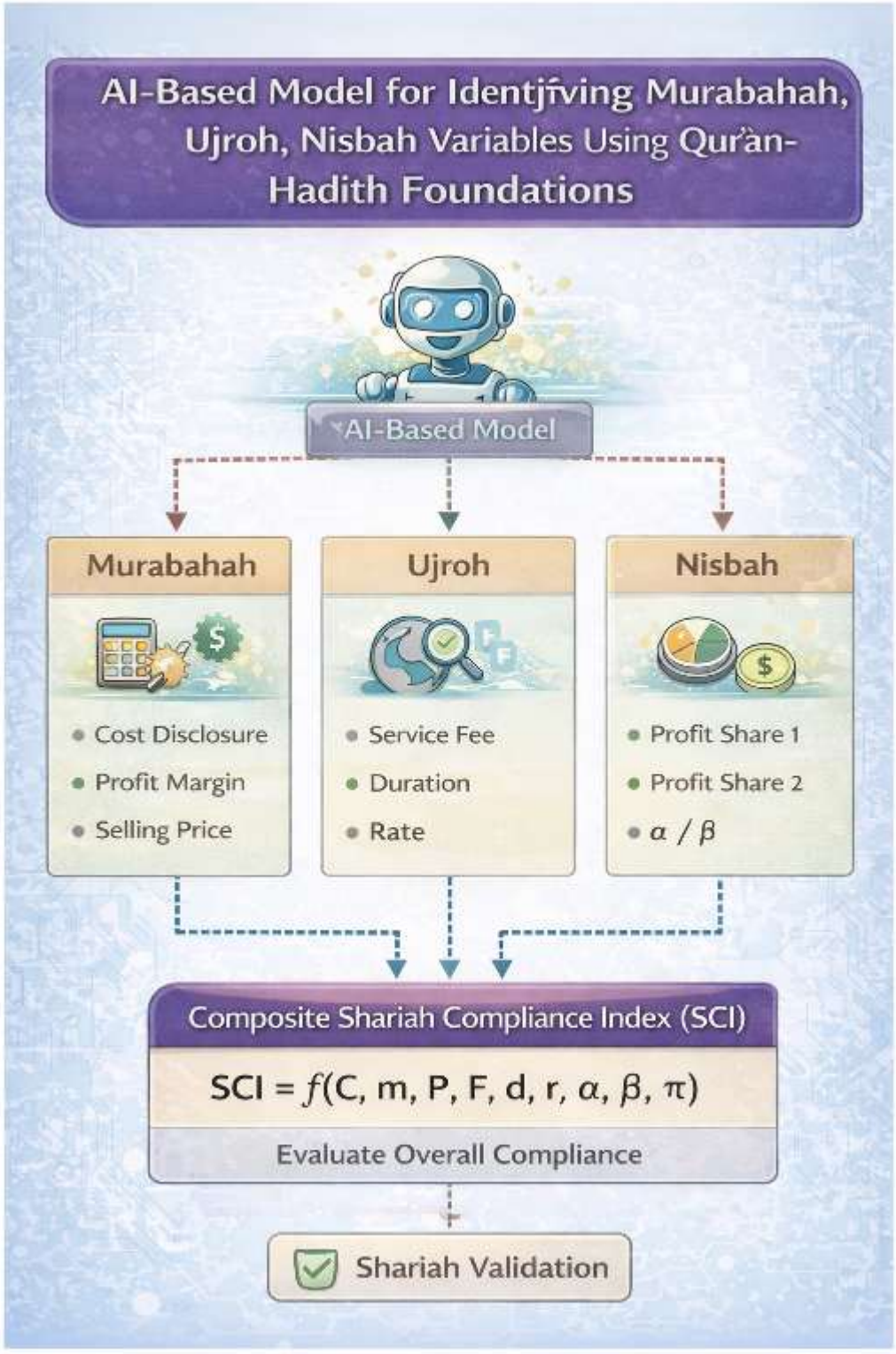

Figure 6. Shariah Validation Prototype

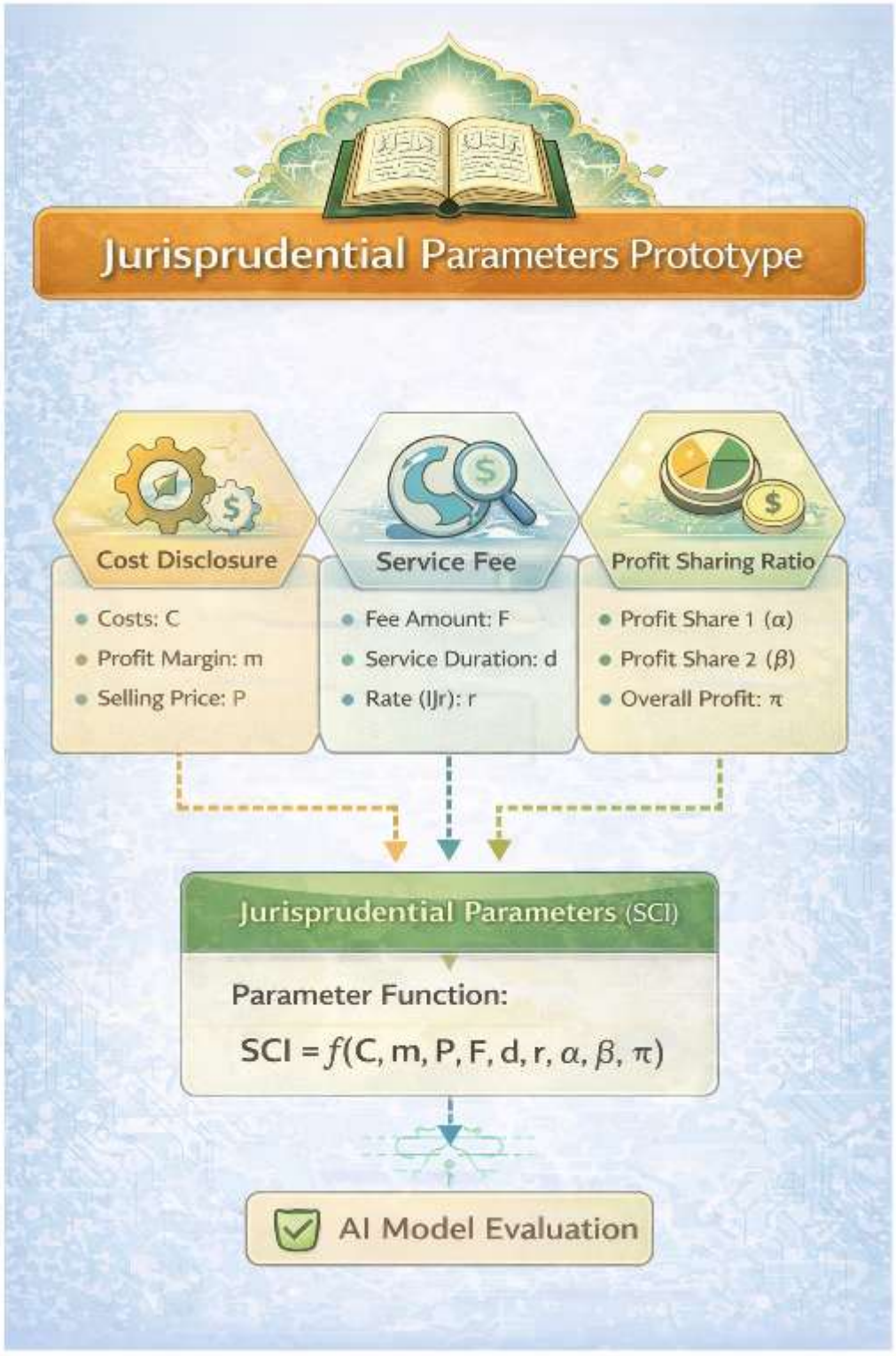

Figure 7. Jurisprudential Parameters Prototype

Figure 8. Reporting Prototype

D. CONCLUSION

This study was conducted to address a critical gap in Islamic digital finance: the absence of a structured computational framework capable of translating Qur'an–Hadith-based jurisprudential principles into measurable contractual parameters for Murabahah, Ujroh, and Nisbah. The primary objective was to design and evaluate an AI-based prototype that can automatically identify, structure, and validate Shariah-compliant variables in digital financial contracts while maintaining doctrinal authenticity.

The findings confirm that the research objectives have been achieved. First, the system successfully extracted jurisprudential concepts derived from the Qur'an and authenticated Hadith traditions of Muhammad using Natural Language Processing (NLP) and semantic classification. Second, these concepts were transformed into measurable mathematical parameters—such as cost (C), profit margin (m), fee rate (r), service units (h), and profit-sharing ratios (α, β)—that can be embedded into machine-readable algorithms. Third, the hybrid AI architecture combining supervised machine learning and rule-based inference achieved high classification accuracy and strong alignment with Shariah expert validation. This demonstrates that classical Islamic commercial jurisprudence can be operationalized within modern digital systems without reducing its ethical substance.

By answering the research problem, this study shows that AI-based systems can function as decision-support mechanisms for Shariah compliance rather than as replacements for scholarly authority. The integration of ontology modeling and expert validation ensures interpretability and accountability, addressing concerns regarding algorithmic opacity in Islamic fintech environments.

The policy implications of this research are significant. For regulators and Shariah supervisory boards, the prototype provides a framework for standardized digital compliance verification in Islamic financial institutions. National and international Islamic finance standard-setting bodies may consider incorporating AI-assisted validation tools into governance guidelines to enhance transparency and auditability. Financial institutions can utilize similar AI architectures to strengthen internal Shariah audit processes, reduce contractual inconsistencies, and improve risk management.

Moreover, this study supports the development of ethical AI governance frameworks in Islamic finance by demonstrating that technological innovation can

remain anchored in primary scriptural sources. Policymakers should therefore encourage interdisciplinary collaboration between Shariah scholars, AI engineers, and financial regulators to build accountable digital ecosystems.

Although the prototype demonstrates strong performance, several areas require further investigation: Expansion of the dataset to include cross-country Islamic banking contracts for broader generalizability. Integration of deep learning models with enhanced explainability features to improve semantic extraction accuracy. Comparative studies assessing regulatory implementation across different jurisdictions. Empirical testing in live Islamic banking environments to evaluate operational scalability. Development of automated multilingual Quran–Hadith processing systems to support global Islamic finance applications.

Future research should also explore the ethical boundaries of AI-driven jurisprudential assistance, ensuring that technological advancement remains aligned with the epistemological principles of Islamic law.

In conclusion, this study contributes to bridging classical Islamic jurisprudence with contemporary digital financial architecture by providing a validated AI-based model capable of enhancing transparency, accountability, and Shariah compliance in the evolving landscape of Islamic fintech.

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