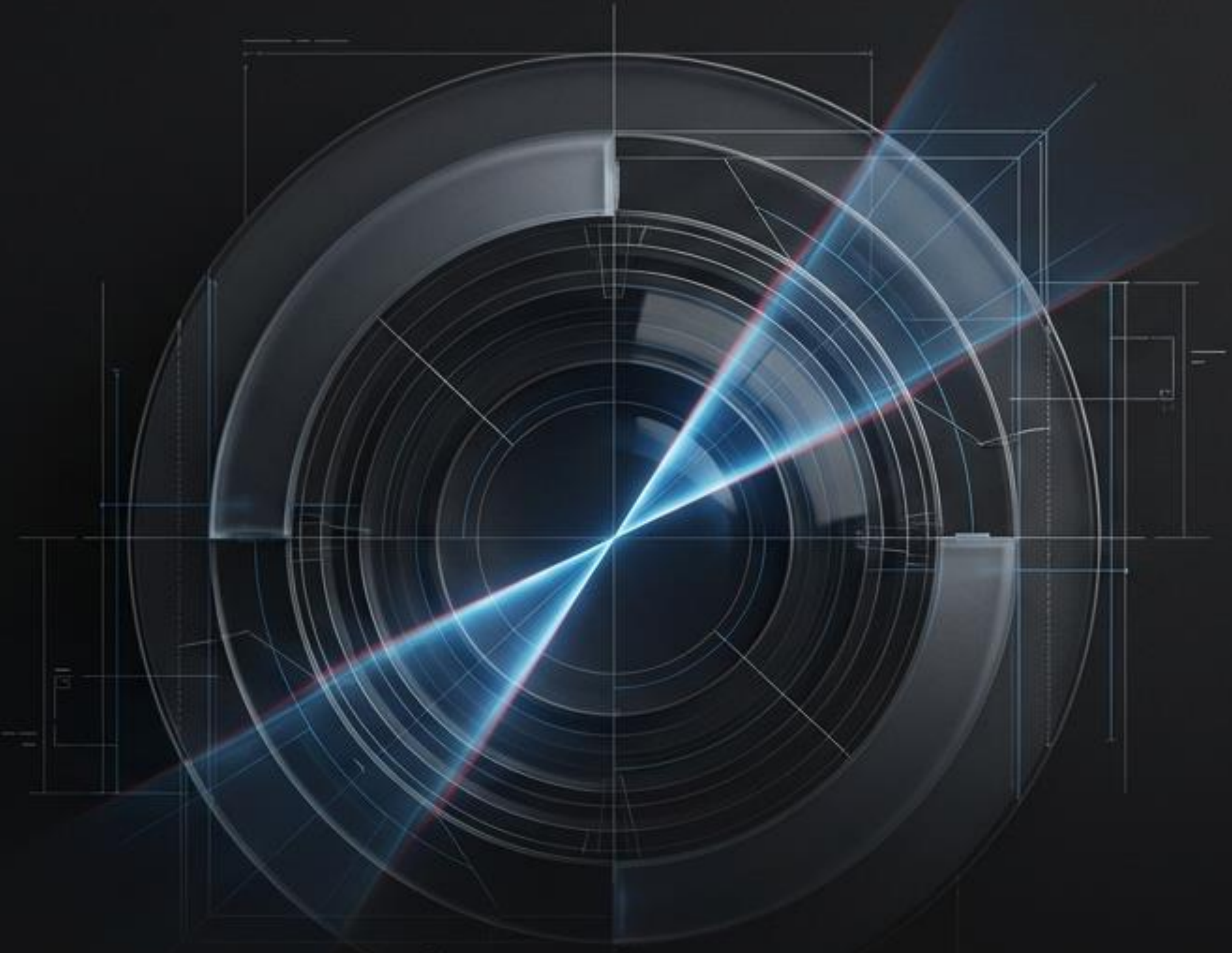

Fake Job Listing Detection

Deep Learning & Agentic Generative AI

MILESTONE 1 REPORT

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The Current Landscape: A Crisis of Trust

FTC Warns of Surge in Fake Job Scams
NYTimes.com - Oct 24, 2023
Agency reports record complaints as scammers exploit remote work trends...

Thousands Fall Victim to LinkedIn Phishing Attacks
TechCrunch - Nov 15, 2023
Malicious actors impersonate recruiters to steal personal data and credentials...

The ‘Ghost Job’ Problem: Why Your Application is Ignored
Forbes - Dec 1, 2023
Many listings are fake or inactive, used for market research or data collection...

How Scammers Use AI to Create Convincing Job Posts
Wired - Dec 12, 2023
Generative AI tools are making it easier to create highly targeted and believable fraudulent listings...

New Report: Financial Losses from Job Fraud Hit Record High
FBI.gov - Jan 5, 2024
Victims report significant monetary losses through advance-fee fraud and identity theft...

Widespread fraud. Financial impact. Eroding confidence.

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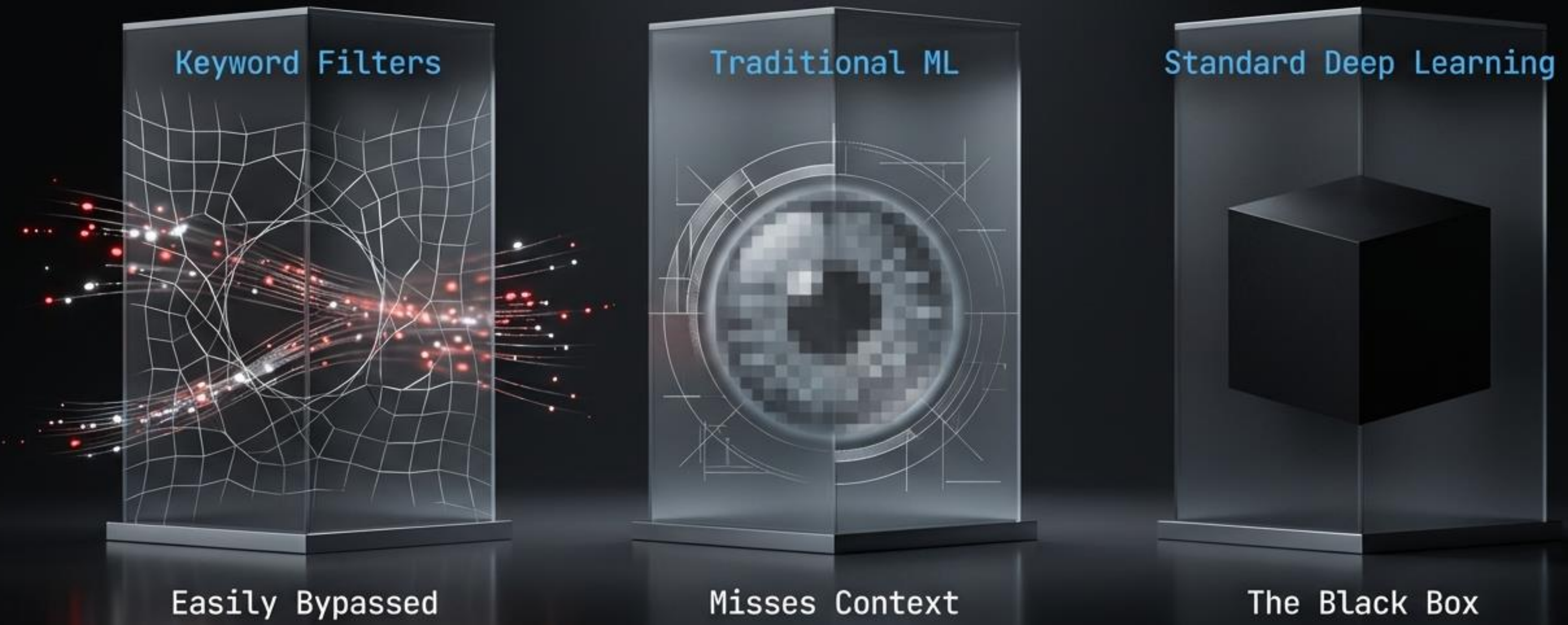
Why Current Defenses Fail



We need verification, not just classification.

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THE DETECTION LANDSCAPE: FIVE APPROACHES

01 RULE-BASED

Keyword Filtering. Simple matching, easily bypassed.

02 CLASSICAL ML

Naive Bayes / Random Forest. Uses TF-IDF features.

03 DEEP LEARNING

CNN / LSTM. Better context, black box.

04 TRANSFORMERS

BERT / RoBERTa. State-of-the-art text understanding.

05 EXPLAINABLE AI

LIME / SHAP. Feature weights, not user explanations.

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Performance Leaderboard

Transformers define the current ceiling for text accuracy

Model Approach	
Rule-Based (Keyword Filter)	Accuracy: Low | F1: Low
Classical ML (Random Forest)	Accuracy: 97% | F1: 0.82
Deep Learning (BiLSTM)	Accuracy: 97% | F1: 0.83
Transformer (BERT)	Accuracy: 98% | F1: 0.88
Transformer (RoBERTa)	**Best Baseline** Accuracy: 98.5% | F1: 0.91

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THE BLIND SPOT: WHY HIGH ACCURACY ISN'T ENOUGH

Critical weaknesses in existing approaches.

NO METADATA VERIFICATION

Models ignore email domains, missing info, and salary ranges.

BLACK BOX PREDICTIONS

Outputs a score without explanation. Hard to trust.

POOR CLASS IMBALANCE HANDLING

Only ~4.8% of listings are fake; models miss fraud cases.

NO HUMAN-READABLE EXPLANATION

LIME/SHAP provide numbers, not plain-language reports.

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Gap Analysis

Fractures in current defenses

Gap 1: No multi-step verification (Domain/Salary ignored)

Gap 2: No narrative explanation (Just scores)

Gap 3: Metadata is ignored (Email/Location missing)

Gap 4: Class imbalance unresolved (Low recall)

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Bridging the Gaps: The Proposed System

RoBERTa Classifier	Fixes: Text Understanding	Fine-tuned transformer achieves ~98.5% accuracy.
Agentic Verification	Fixes: Multi-step Reasoning	Checks company domain, email pattern, and salary.
Generative AI Layer	Fixes: Human-Readable Report	Produces a plain-language fraud report.
Text + Metadata Pipeline	Fixes: Ignoring Metadata	Combines text signals and structured data.

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Key Differentiators

Feature	Traditional ML	Deep Learning	Proposed System
Context Understanding	Low	High	High ✓
Metadata Verification	No ✗	No ✗	Yes ✓
Multi-step Reasoning	No ✗	No ✗	Yes ✓
Structured Explanation	No ✗	Limited	Yes ✓
Agent-Based System	No ✗	No ✗	Yes ✓

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A Hybrid Approach

Transformer Models

Agentic Verification

Trust & Explainability

Combining RoBERTa for text understanding with Agents for fact-checking.

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Project Context & Importance.

Why Fraud Detection Matters

- Financial Loss
- Identity Theft
- Reputational Damage

Stakeholders

- Job Seekers
- Employers
- Platforms

Current Status of Job Scams

- Increasing Volume
- Higher Sophistication
- Low Detection Rate

Scope & Boundaries

In-Scope	Out-of-Scope
• Text Analysis • Salary Verification • Domain Checks	• Legal Action • Dark Web Monitoring • Physical Verification

Project Analysis

Data Collection → Model Training → Testing & Validation → Deployment

Addressing the urgent need for advanced fraud detection mechanisms.

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The Agentic Workflow

Domain Validator

Checks company website & email legitimacy.

Salary Ranger

Detects unrealistically high salaries vs market rates.

Metadata Scout

Flags anomalies in location or contact info.

Multi-step reasoning to cross-check suspicious attributes.

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Not Just a Score.
A Story.

Generative AI provides structured, plain-language warnings.

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Target Objectives: Robust Multi-Step Verification & Use Case

Raw Data

Multi-Step Verification
(Domain, Salary, Metadata)

Robust Prediction Model

Real-world Use Case
(e.g., Fraud Detection)

95%

Target Accuracy
95%

F1-Score
>0.90

3+
Verification Tools Integrated

EMSCAD
Benchmark Dataset

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The Builders (Milestone 1)

Arun Dutta

Literature Review & Gap Analysis

- State-of-the-art methods (SOTA)
- Identify existing dataset limitations

Hritik Roshan Maurya

Problem Framing & System Architecture

- Define problem scope and objectives
- Architectural diagram & module breakdown

Vivek Bajaj

Data Pipeline & Deep Learning Workflow

- Data cleaning, preprocessing, & augmentation
- Model selection, training, & hyperparameter tuning

Vishwas Mehta

Fraud Pattern Analysis & Domain Research

- Analyze common fraud tactics
- Consult with domain experts for feature engineering

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Status & Next Steps

Research & Architecture
Milestone 1 Complete

Prototype Development
In Progress

Integration & Testing
Upcoming

Moving from architecture to implementation.

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