Patent Filing: Algorithmic Bias Mitigation Technique

CONFIDENTIAL DOCUMENT

NEXUS INTELLIGENT SYSTEMS, INC.

Patent Application No. NIS-2024-0037

1. INTRODUCTION

1 This Patent Application ("Application") is submitted by Nexus Intelligent Systems, Inc., a Delaware corporation with principal offices located at 1200 Technology Park Drive, Austin, Texas 78758 (hereinafter "Applicant" or "NIS").

2 The present Application covers a novel Algorithmic Bias Mitigation Technique designed to systematically identify, quantify, and neutralize inherent statistical biases within machine learning predictive models.

2. TECHNICAL BACKGROUND

1 Field of Invention

The present invention relates to artificial intelligence systems, specifically machine learning algorithmic design with enhanced fairness and statistical neutrality protocols.

2 Prior Art Limitations

Existing algorithmic bias mitigation techniques have demonstrated significant shortcomings:

- Inability to dynamically adjust bias correction in real-time
- Static bias measurement frameworks
- Limited cross-domain applicability
- Computationally intensive remediation processes

3. INVENTION SUMMARY

1 Technical Problem

Machine learning models frequently perpetuate historical discriminatory patterns through inherited statistical biases, compromising decision-making integrity across critical domains including:

- Employment screening

- Financial risk assessment
- Healthcare diagnostics
- Criminal justice predictive modeling

2 Technical Solution

The proposed technique introduces a multi-stage algorithmic intervention mechanism featuring:

- Dynamic bias detection protocols
- Probabilistic re-weighting of training datasets
- Continuous statistical normalization
- Contextual feature importance recalibration

4. DETAILED DESCRIPTION

1 Algorithmic Architecture

The bias mitigation technique comprises five interconnected computational modules:

a) Statistical Baseline Establishment Module

- Quantifies existing dataset demographic distributions
- Identifies potential representational disparities
- Generates comprehensive bias metrics

b) Adaptive Resampling Module

- Dynamically adjusts training data composition
- Implements stratified sampling techniques
- Ensures proportional representation across demographic segments

c) Feature Importance Recalibration Module

- Identifies statistically significant predictive features
- Neutralizes potentially discriminatory feature weightings
- Implements machine learning interpretability protocols

d) Continuous Monitoring Module

- Tracks model performance across demographic subgroups
- Generates real-time bias deviation alerts
- Enables automated intervention mechanisms

e) Probabilistic Normalization Module

- Applies statistical transformation techniques
- Redistributes predictive probability distributions
- Maintains overall model predictive accuracy

5. CLAIMS

1 Primary Claims

NIS claims exclusive intellectual property rights to:

- The specific algorithmic bias mitigation methodology
- Associated computational implementation techniques
- Systematic approach to dynamic bias correction

2 Claim Specificity

The proposed technique distinguishes itself through:

- Computational efficiency
- Domain-agnostic applicability
- Real-time bias intervention capabilities

6. INVENTORS

1 Primary Inventors

- Dr. Elena Rodriguez, Chief Executive Officer
- Michael Chen, Chief Technology Officer
- Dr. Rajesh Patel, Senior Machine Learning Architect

7. LEGAL REPRESENTATIONS

1 The undersigned hereby certifies that:

- All statements are made with best knowledge and belief
- All technical descriptions are accurate and complete
- No intentional misrepresentation is contained herein

8. SIGNATURE BLOCK

Executed this 22nd day of January, 2024

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