

# Provisional Patent Application

## Neural Network Optimization Technique

UNITED STATES PATENT AND TRADEMARK OFFICE

Provisional Patent Application

**Applicant:** Nexus Intelligent Systems, Inc.

**Inventor:** Dr. Michael Chen

**Filing Date:** January 22, 2024

**Application Number:** NIS-2024-001

### 1. TECHNICAL FIELD

This provisional patent application relates to an innovative neural network optimization technique specifically designed to enhance predictive maintenance algorithms in complex industrial environments, with particular applicability to machine learning diagnostic tools and adaptive performance modeling.

### 2. BACKGROUND OF THE INVENTION

#### 1 Current State of Technology

Existing neural network architectures demonstrate significant limitations in real-time adaptive learning environments, particularly within industrial predictive maintenance contexts. Traditional machine learning models suffer from:

- Reduced accuracy in dynamic operational environments
- High computational overhead
- Limited adaptive capacity
- Insufficient noise tolerance

#### 2 Technical Challenges

Industrial predictive maintenance systems require sophisticated algorithms capable of:

- Rapid performance recalibration
- Minimal computational resource consumption
- High-fidelity signal processing
- Robust noise filtering mechanisms

### **3. SUMMARY OF THE INVENTION**

#### **1 Technical Overview**

The present invention introduces a novel neural network optimization technique characterized by:

- Adaptive gradient compression algorithms
- Dynamic feature extraction mechanisms
- Probabilistic noise reduction protocols
- Intelligent resource allocation strategies

#### **2 Key Innovation Parameters**

- Computational efficiency improvement: Up to 47% reduction in processing overhead
- Predictive accuracy enhancement: Minimum 35% increased signal-to-noise ratio
- Adaptive learning rate: Near-instantaneous model recalibration

### **4. DETAILED DESCRIPTION**

#### **1 Architectural Components**

The proposed neural network optimization technique comprises:

- a) Adaptive Gradient Compression Module
- b) Dynamic Feature Extraction Layer
- c) Probabilistic Noise Reduction Protocol
- d) Intelligent Resource Allocation Framework

#### **2 Operational Methodology**

The invention implements a multi-stage optimization process:

- Initial model configuration
- Continuous performance monitoring
- Adaptive parameter recalibration
- Intelligent resource reallocation

### **5. TECHNICAL SPECIFICATIONS**

#### **1 Computational Requirements**

- Minimum Processing Capacity: 8 CPU cores
- Recommended RAM: 32 GB

- Optimal GPU Configuration: CUDA-enabled graphics processor

## 2 Performance Metrics

- Latency Reduction: <50 milliseconds
- Accuracy Improvement: >35% compared to baseline models
- Resource Utilization: Adaptive, context-dependent allocation

## 6. POTENTIAL APPLICATIONS

### 1 Industrial Sectors

- Manufacturing predictive maintenance
- Energy infrastructure monitoring
- Transportation fleet management
- Advanced robotics systems

### 2 Technology Domains

- Machine learning diagnostics
- Adaptive performance modeling
- Intelligent automation platforms

## 7. PATENT CLAIMS

### 1 Primary Claim

A neural network optimization method characterized by:

- Adaptive gradient compression
- Dynamic feature extraction
- Probabilistic noise reduction
- Intelligent resource allocation

### 2 Derivative Claims

Subsidiary claims covering specific implementation variations and technological adaptations.

## 8. LEGAL DISCLAIMERS

### 1 Confidentiality

This provisional patent application contains proprietary and confidential information belonging

exclusively to Nexus Intelligent Systems, Inc.

2 Patent Pending Status

All technological descriptions herein are subject to pending patent protection.

## **9. SIGNATURE BLOCK**

**Inventor Signature:**

**Dr. Michael Chen**

**Chief Technology Officer**

**Nexus Intelligent Systems, Inc.**

**Date: January 22, 2024**