## 5 CONCLUSIONS (CLAIMS)

**Claim 1**

A computer system for automated AI model risk analysis, comprising:

a) a multi-framework analysis module that analyzes machine learning models for PyTorch, TensorFlow, ONNX, and scikit-learn frameworks;

b) a bias detection engine that identifies discriminatory patterns using demographic parity, equalized odds, calibration score, and individual fairness algorithms;

c) an EU AI Act compliance assessor that analyzes 64 articles (56.6% coverage) according to Articles 4-94, including Articles 5 (prohibited practices), 8-15 (high-risk requirements), 16-27 (obligations), 38-46 (conformity assessment), 50 (transparency), 51-56 (GPAI), 60-75 (governance), 85-94 (enforcement);

wherein the system automatically generates compliance reports with penalty calculations up to EUR 35 million.

**Claim 2**

The system according to claim 1, wherein the bias detection engine implements the following mathematical formulas:

a) Demographic Parity: P(Y=1|A=0) ~ P(Y=1|A=1) with a threshold value of 0.80;

b) Equalized Odds: TPR_A=0 ~ TPR_A=1 AND FPR_A=0 ~ FPR_A=1;

c) Calibration Score: P(Y=1|Score=s,A=0) ~ P(Y=1|Score=s,A=1);

d) Individual Fairness: d(f(x1),f(x2)) <= L*d(x1,x2).

**Claim 3**

The system according to claim 1, wherein the EU AI Act compliance assessor comprises:

a) an Article 5 scanner that detects prohibited practices with penalty of EUR 35 million or 7% of global turnover;



b) an Articles 8-27 validator for high-risk systems (Art. 8-15:

requirements; Art. 16-27: provider/deployer obligations) with penalty of EUR 15 million or 3% of global turnover;

c) an Articles 51-56 checker for General Purpose AI models including compute threshold monitoring and Codes of Practice (Art. 54-56).

**Claim 4**

A Netherlands specialization module according to claim 1, comprising:

a) a BSN (Burgerservicenummer/Citizen Service Number) detection algorithm with 9-digit pattern recognition and checksum validation;

b) a UAVG compliance validator with Dutch Data Protection Authority (Autoriteit Persoonsgegevens - AP) integration;

c) a regional penalty calculator with Netherlands compliance multipliers.

**Claim 5**

The system according to claim 4, wherein the BSN detection algorithm:

a) identifies 9-digit patterns in model training data;

b) performs official checksum validation according to Netherlands specifications using the formula: checksum = (digit_0 x 9) + (digit_1 x 8) + (digit_2 x 7) + (digit_3 x 6) + (digit_4 x 5) + (digit_5 x 4) + (digit_6 x 3) + (digit_7 x 2) - (digit_8 x 1), wherein BSN is valid if checksum mod 11 == 0;

c) generates privacy risk assessment according to GDPR Article 9;

d) provides automatic anonymization recommendations.

**Claim 6**

The system according to claim 1, wherein the multi-framework analysis module:

a) analyzes PyTorch models via torch.load() and model.parameters() enumeration;

b) processes TensorFlow models with tf.keras.models.load_model() and model.count_params();

c) examines ONNX models with onnx.load() and onnxruntime.InferenceSession();

d) deserializes scikit-learn models with joblib.load() validation.



**Claim 7**

The system according to claim 2, wherein the bias detection engine:

a) calculates demographic parity with a threshold of 80% for group equality;

b) evaluates equalized opportunities for True Positive Rate and False Positive Rate between protected groups;

c) measures calibration scores for prediction reliability per demographic group;

d) tests individual fairness via Lipschitz continuity with factor L=1.0.

**Claim 8**

The system according to claim 3, wherein the EU AI Act compliance assessor:

a) detects prohibited practices including social scoring, manipulation, and biometric identification;

b) validates high-risk systems for quality management systems and technical documentation;

c) assesses General Purpose AI models for parameter count >1 billion and compute thresholds;

d) performs automatic penalty calculations according to EU AI Act Articles 82-85.

**Claim 9**

The system according to claim 4, wherein the Netherlands specialization module:

a) implements BSN checksum algorithm according to official Netherlands specifications with the correct formula wherein the last digit (digit_8) is multiplied by factor 1 and subtracted;

b) validates UAVG compliance for data residency, local representation, and AP notification;

c) applies regional penalty multipliers for Netherlands privacy violations;

d) provides Dutch language support for privacy policies and compliance reports.



Claim 10

The system according to claim 1, comprising a real-time monitoring system that:

a) performs continuous compliance monitoring with automated scanning;

b) uses pattern matching algorithms for anomaly detection;

c) generates automatic alerts upon compliance violations;

d) provides remediation recommendations with Netherlands legal guidance.

**Claim 11**

The system according to claim 1, wherein the system:

a) completes processing within 30 seconds for standard models and 5 minutes for Large Language Models;

b) achieves 95% accuracy for bias detection and 98% for compliance classification;

c) has less than 3% false positive rate for prohibited practice detection;

d) provides support for model formats .pt, .pth, .h5, .pb, .onnx, .pkl, .joblib.

Claim 12

The system according to claim 1, wherein the system further comprises:

a) PostgreSQL database for scan results and compliance history storage;

b) Redis caching layer for performance optimization;

c) Docker containerization for horizontal scaling;

d) API endpoints for enterprise integration with existing ML pipelines.

**Claim 13**

The system according to claim 1, wherein penalty calculations:

a) determine maximum penalties of EUR35 million or 7% global turnover for Article 5 violations;

b) calculate EUR15 million or 3% global turnover for Articles 19-24 violations;

c) apply Netherlands UAVG multipliers for regional compliance requirements;

d) activate automatic escalation triggers upon high-risk detections.

**Claim 14**

A method for automated AI model compliance verification, comprising the steps of:

a) model framework detection and architecture analysis;

b) bias assessment execution with four fairness algorithms;

c) EU AI Act compliance evaluation according to applicable articles;

d) Netherlands privacy compliance verification including BSN detection with correct checksum validation;

e) real-time monitoring and alert generation for compliance violations.

Claim 15

A computer-readable medium containing instructions that, when executed by a processor, implement the system according to claim 1, wherein the instructions:

a) contain multi-framework model analysis routines;

b) implement mathematical bias detection algorithms with correct formulas;

c) execute EU AI Act compliance assessment procedures;

d) activate Netherlands specialization modules with correct BSN validation according to official Dutch 11-proof algorithm;

e) provide real-time monitoring and reporting functions.

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**END OF CONCLUSIONS**

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