Knobbe Martens

Advanced Claiming Strategies for Artificial Intelligence/Machine Learning Inventions

AI/ML発明の高度なクレーム戦略

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Machine Learning/Artificial Intelligence

- Minimal Requirements for an Algorithm to be ML
  - Representation (表現) – Classifiers or basic language that a computer can understand
  - Evaluation (評価)– Inputting data and generating output (score)
  - Optimization (最適化)– Developing a strategy to get from inputs to outputs

Learning Models

1. Supervised Learning
   教師あり学習
2. Unsupervised Learning
   教師なし学習
3. Semi-Supervised Learning
   半教師あり学習
4. Reinforcement Learning
   強化学習

Best Practices – Specification Drafting 明細書作成時のベストプラクティス

Best Practices –ベストプラクティス-

- **U.S. Best Practices　アメリカでのベストプラクティス**

1. Include description of the technical substance underlying the AI technology. Simply relying on black box description of “artificial intelligence” or “machine learning” will likely not be sufficient.
   AI技術の基礎となる技術内容を説明を含めること。単に、“artificial intelligence” や “machine learning” をブラックボックス的に使う事では通常十分ではない。

2. Avoid personification of “modules” or “processors”
   “modules” or “processors”の擬人化を避ける。

3. Include detailed step-by-step algorithms and concrete examples of how the AI/machine learning can be applied.
   詳細なステップごとのアルゴリズムと、どのようにAI/機械学習が適用されるかの具体的な例を含める。

Exemplary Algorithm Types　アルゴリズムタイプの例示

	Unsupervised Learning Algorithms	Supervised Learning Algorithms

Classification Output	• Association Rule Analysis
	  • Apriori
	  • Equivalence Class Transformation
	  • FP-Growth
	• Hidden Markov Model
		• Classification
		  • K-Nearest Neighbors
		  • Decision/Boosted Trees
		  • Logic Regression/Naive-Bayes
		  • Neural Networks
		  • Support Vector Machine (SVM)

Continuous Output	• Clustering and Dimensionality
	  • K-Means
	  • Singular Value Decomposition
	  • Principle Component Analysis
		• Regression
		  • Linear Regression
		  • Polynomial Regression
		• Decision Trees
		• Random Forests

Protecting ML/AI Related Products and Services
ML/AI関連製品及びサービスの保護

Protecting ML Technologies　ML技術の保護

Data Set Generation and Inputs

データセット生成及び入力

- Potential Patentable Subject Matter
  - Collecting or Forming Data Set
  - Supplementing Data Set

ML Processing

MLプロセス

- Potential Patentable Subject Matter
  - Modifications/Improvements to AI algorithms

ML Results and Post Processing

ML結果及び後処理

- Potential Patentable Subject Matter
  - Post-processing feedback
  - Use of ML processed data

Claim Drafting - Collecting or Forming Data Set
クレイム作成ーデータセットの収集または生成

Example 39 - Method for Training a Neural Network for Facial Detection
USPTOが例示する、特許適格性を有する例

1. A computer-implemented method of training a neural network for facial detection comprising:

collecting a set of digital facial images from a database;

applying one or more transformations to each digital facial image including mirroring, rotating, smoothing, or contrast reduction to create a modified set of digital facial images;

creating a first training set comprising the collected set of digital facial images, the modified set of digital facial images, and a set of digital non-facial images;

training the neural network in a first stage using the first training set;

creating a second training set for a second stage of training comprising the first training set and digital non-facial images that are incorrectly detected as facial images after the first stage of training; and

training the neural network in a second stage using the second training set.

Example 39 - Method for Training a Neural Network for Facial Detection
USPTOが例示する、特許適格性を有する例

1. A computer-implemented method of training a ~~neural network~~ machine learning algorithm for facial detection comprising:

collecting a set of digital facial images from a database;

applying one or more transformations to each digital facial image including mirroring, rotating, smoothing, or contrast reduction to create a modified set of digital facial images;

creating a first training set comprising the collected set of digital facial images, the modified set of digital facial images, and a set of digital non-facial images;

training the ~~neural network~~ machine learning algorithm in a first stage using the first training set;

creating a second training set for a second stage of training comprising the first training set and digital non-facial images that are incorrectly detected as facial images after the first stage of training; and

training the ~~neural network~~ machine learning algorithm in a second stage using the second training set.

Method for Training a Neural Network for Facial Detection – Sample Dependent Claims
従属クレームの例

2. The computer-implemented method as recited in Claim 1, wherein the machine learning algorithm corresponds to a supervised learning-based machine learning algorithm.

3. The computer-implemented method as recited in Claim 1, wherein the supervised learning-based machine learning algorithm corresponds to a neural network.

4. The computer-implemented method as recited in Claim 1 further comprising:

   obtaining a set of target input digital facial images;

   processing the set of target input digital facial images with the trained machine learning algorithm; and

   generating a processing result corresponding to the processing.

Sample Claim – Predicting Failure – Data Sources

Claim

1. A failure predicting apparatus for predicting a failure timing of a printed circuit board included in a management target device, the failure predicting apparatus comprising:

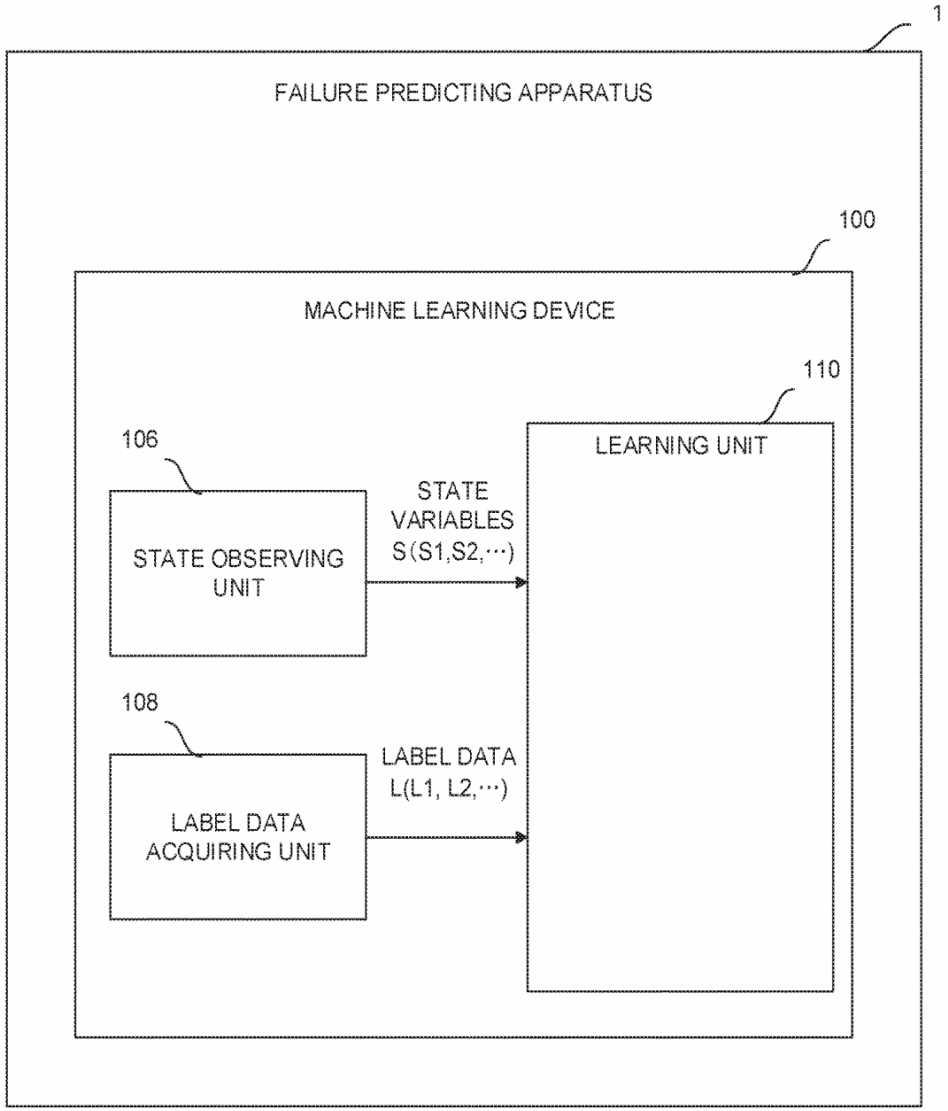
a machine learning device that learns the failure timing of the printed circuit board included in the management target device with respect to an operating state of the management target device,

wherein the machine learning device includes a state observing unit that observes, as state variables indicating a current environmental state, operating state data indicating an operating state of the management target device and device configuration data indicating a device configuration of the management target device,

a label data acquiring unit that acquires, as label data, maintenance history data indicating a maintenance history of the management target device, and

a learning unit that, by using the state variables and the label data, learns the failure timing of the printed circuit board included in the management target device, the operating state data, and the device configuration data such that the failure timing is associated with the operating state data and the device configuration data.

Figure 2



Sample Claim – Predicting Failure – Data Sources

1. A method for management of a target device, the method comprising:

obtaining a first set of inputs corresponding to state observing unit data, wherein the state observing unit data corresponds to state variables indicating a current environmental state, operating state data indicating an operating state of the target device;

obtaining device configuration data indicating a device configuration of the management target device,

obtaining a second set of inputs corresponding to label data unit data, wherein the label data that acquires, as label data, maintenance history data indicating a maintenance history of the management target device, and

processing, using a machine learned algorithm, the first set of inputs and the second set of inputs, to characterize a likelihood that the target device will experience a failure.

Claim Drafting - Use of ML Processed Data
クレイム作成 – ML処理済みデータの使用

Sample Claim – Use of ML Processed Data ML　処理後データの使用

1. A system for charactering user input in network-based services, the system comprising:

one or more computing devices associated with a processor and a memory for executing computer-executable instructions to implement an input management service, wherein the input management service is configured to:

obtain a set of customer inputs as customer feedback related to one or more network services hosted on behalf of network service providers;

vectorize the set of customer inputs to form a set of vectorized customer inputs using a machine learned algorithm, wherein vectorizing the set of customer inputs includes generating an individual numerical vector for individual customer inputs from the set of customer inputs;

cluster the set of vectorized customer inputs, wherein clustering the set of vectorized inputs includes aggregating semantically similar vectorized customer inputs based on comparison of the numerical vectors; and

generate a processing result based on the prioritized, filtered clusters.

2. The system as recited in Claim 1, wherein the machine learning algorithm corresponds to a unsupervised learning-based machine learning algorithm.

3. The system as recited in Claim 1, wherein the unsupervised learning-based machine learning algorithm corresponds to a clustering and dimensionality algorithm.

Sample Claim – Machine Learning System　機械学習システム

1. A machine-implemented method, comprising:

   collecting a plurality of human-generated requests for each of a plurality of task categories to create a training database of user requests;

   extracting a training feature vector from each user request in the training database by assigning a binary value to each different word in the user request to form a training data set having a plurality of training feature vectors for each task category;

   processing the training feature vectors in the training data set to determine a task classifier model for each task category;

   receiving an additional request from a user, the additional request being classifiable into one of the task categories; and

   comparing an extracted feature vector from the additional request to the task classifier model to determine a predicted task category for the additional request.

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Thank you!