

CLAIMS

1. A credit evaluation method, comprising the following steps:
 acquiring historical credit data, and constructing an AI risk control engine according to the historical credit data;
 when a loan request is received, acquiring pre-loan user data of a loan user corresponding to the loan request, and inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation; and
 acquiring an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and generating a corresponding decision and suggestion according to the expert evaluation conclusion and the AI evaluation conclusion;
 wherein the historical credit data comprises historical pre-loan data and historical post-loan data,
 the step of acquiring historical credit data, and constructing an AI risk control engine according to the historical credit data comprises:
 using the historical pre-loan data and the historical post-loan data as an input training set and an output training set respectively, and training an initial machine learning model based on the input training set and the output training set to obtain an AI risk control engine.
2. The credit evaluation method according to claim 1, wherein the initial machine learning model is subjected to a cold start by means of expert rules.
3. The credit evaluation method according to claim 1, wherein input elements in the input training set comprise a multi-dimensional vector x with a dimension of m , and output elements in the output training set comprise a non-performing loan ratio y ,
 the step of training an initial machine learning model based on the input training set and the output training set to obtain an AI risk control engine comprises:
 combining the input elements with the output elements to define m multi-dimensional training vector groups;

$$\{(x^1, y^1), (x^2, y^2), \dots, (x^m, y^m)\} ;$$

learning a multi-dimensional training vector in the multi-dimensional training vector group based on a Gradient Boosting Decision Tree (GBDT) algorithm to obtain a corresponding decision tree,

$$T(x; \theta_m) ,$$

wherein θ_m is a parameter of the decision tree;

performing linearly combining the decision trees to obtain a linear combination tree

$$f_M(x) = \sum_{m=1}^m T(x; \theta_m) ,$$

wherein a cost function of the linear combination tree is

$$f(x) = l(h(x, D), Y) ,$$

wherein the $h(x, D)$ is a hypothesis function, which is a decision result of the decision tree, and a first-order expansion of a Taylor formula of the cost function $f(x)$ is:

$$l(H(x_{t+1})) = l(H(x_t) + h(x_{t+1})) \approx l(H(x_t)) + \nabla l(H(x_t))h(x_{t+1})$$

$$H(x_t) = \sum_{i=1}^t h(x_i)$$

wherein $H(x_t)$ is a weighted sum of the first t decision trees,

$$H(x_{t+1}) = H(x_t) - \gamma \nabla l(H(x_t))$$

is a steepest descent iterative formula,

and

$$h(x_{t+1}) = \nabla l(H(x_t))$$

is a gradient of the hypothesis function; and

obtaining the AI risk control engine according to the linear combination tree and the cost function.

4. The credit evaluation method according to claim 1, wherein the step of acquiring, when a loan request is received, pre-loan user data of a loan user corresponding to the loan request, and

inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation comprises:

when a loan request is received, generating a corresponding data acquisition request according to a user identifier and an authorization grant comprised in the loan request, and sending the data acquisition request to a data management system to obtain corresponding pre-loan user data; and

receiving the pre-loan user data fed back by the data management system, and inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation.

5. The credit evaluation method according to claim 1, wherein the step of acquiring an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and generating a corresponding decision and suggestion according to the expert evaluation conclusion and the AI evaluation conclusion comprises:

acquiring an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and performing a weighted computation based on the expert evaluation conclusion and the AI evaluation conclusion to obtain a credit line of the loan user; and

generating a corresponding loan suggestion according to the credit line, wherein the loan suggestion comprises a loan limit and a loan period.

6. The credit evaluation method according to claim 1, wherein after the step of acquiring an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and generating a corresponding decision and suggestion according to the expert evaluation conclusion and the AI evaluation conclusion, the method further comprises:

acquiring post-loan user data of the loan user, and combining the pre-loan user data and the post-loan user data to obtain an iterative training sample; and

performing iterative training on the AI risk control engine through the iterative training sample to adjust the AI risk control engine.

7. A credit evaluation apparatus, comprising:

an engine construction module, configured to acquire historical credit data, and construct an AI risk control engine according to the historical credit data;

a credit evaluation module, configured to acquire, when a loan request is received, pre-loan user data of a loan user corresponding to the loan request, and input the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation; and

a suggestion generation module, configured to acquire an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and generate a corresponding decision and suggestion according to the expert evaluation conclusion and the AI evaluation conclusion;

wherein the historical credit data comprises historical pre-loan data and historical post-loan data, and the engine construction module is further configured to use the historical pre-loan data and the historical post-loan data as an input training set and an output training set respectively, and train an initial machine learning model based on the input training set and the output training set to obtain an AI risk control engine.

8. The credit evaluation apparatus according to claim 7, wherein the initial machine learning model is subjected to a cold start by means of expert rules.

9. The credit evaluation apparatus according to claim 7, wherein input elements in the input training set comprise a multi-dimensional vector x with a dimension of m , and output elements in the output training set comprise a non-performing loan ratio y ,

the engine construction module is further configured to combine the input elements and the output elements to define m multi-dimensional training vector groups;

$$\{(x^1, y^1), (x^2, y^2), \dots, (x^m, y^m)\} ;$$

learn a multi-dimensional training vector in the multi-dimensional training vector group based on a Gradient Boosting Decision Tree (GBDT) algorithm to obtain a corresponding decision tree,

$$T(x; \theta_m) ,$$

where θ_m is a parameter of the decision tree;

perform linear combination on the decision trees to obtain a linear combination tree

$$f_M(x) = \sum_{m=1}^m T(x; \theta_m) ,$$

wherein a cost function of the linear combination tree is

$$f(x) = l(h(x, D), Y) ,$$

wherein the $h(x, D)$ is a hypothesis function, which is a decision result of the decision tree, and a first-order expansion of a Taylor formula of the cost function $f(x)$ is:

$$l(H(x_{t+1})) = l(H(x_t) + h(x_{t+1})) \approx l(H(x_t)) + \nabla l(H(x_t))h(x_{t+1})$$

$$H(x_t) = \sum_{i=1}^t h(x_i)$$

wherein $\sum_{i=1}^t h(x_i)$ is a weighted sum of the first t decision trees,

$$H(x_{t+1}) = H(x_t) - \gamma \nabla l(H(x_t))$$

is a steepest descent iterative formula,

and

$$h(x_{t+1}) = \nabla l(H(x_t))$$

is a gradient of the hypothesis function; and

obtain the AI risk control engine according to the linear combination tree and the cost function.

10. The credit evaluation apparatus according to claim 7, wherein the credit evaluation module comprises:

a data acquisition unit, configured to generate, when a loan request is received, a corresponding data acquisition request according to a user identifier and an authorization grant comprised in the loan request, and send the data acquisition request to a data management system to obtain corresponding pre-loan user data; and

a credit evaluation unit, configured to receive the pre-loan user data fed back by the data management system, and input the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation.

11. The credit evaluation apparatus according to claim 7, wherein the suggestion generation module comprises:

a weighted computation unit, configured to acquire an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and perform a weighted computation based on the expert evaluation conclusion and the AI evaluation conclusion to obtain a credit line of the loan user; and

a suggestion generation unit, configured to generate a corresponding loan suggestion according to the credit line, wherein the loan suggestion comprises a loan limit and a loan period.

12. The credit evaluation apparatus according to claim 7, further comprising:

a data combination module, configured to acquire post-loan user data of the loan user, and combine the pre-loan user data with the post-loan user data to obtain an iterative training sample; and

an iterative training module, configured to perform iterative training on the AI risk control engine through the iterative training sample to adjust the AI risk control engine.

13. A credit evaluation device, comprising a processor, a memory, and a credit evaluation program stored on the memory and executable by the processor, wherein when the credit evaluation program is executed by the processor, the following steps are implemented:

acquiring historical credit data, and constructing an AI risk control engine according to the historical credit data;

when a loan request is received, acquiring pre-loan user data of a loan user corresponding to the loan request, and inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation; and

acquiring an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and generating a corresponding decision and suggestion according to the expert evaluation conclusion and the AI evaluation conclusion;

wherein the historical credit data comprises historical pre-loan data and historical post-loan data, and

the step of acquiring historical credit data, and constructing an AI risk control engine according to the historical credit data comprises:

using the historical pre-loan data and the historical post-loan data as an input training set and an output training set respectively, and training an initial machine learning model based on the input training set and the output training set to obtain an AI risk control engine.

14. The credit evaluation device according to claim 13, wherein the initial machine learning model is subjected to cold start by means of expert rules.

15. The credit evaluation device according to claim 13, wherein input elements in the input training set comprise a multi-dimensional vector x with a dimension of m , and output elements in the output training set comprise a non-performing loan ratio y ,

the step of training an initial machine learning model based on the input training set and the output training set to obtain an AI risk control engine comprises:

combining the input elements with the output elements to define m multi-dimensional training vector groups;

$$\{(x^1, y^1), (x^2, y^2), \dots, (x^m, y^m)\} ;$$

learning a multi-dimensional training vector in the multi-dimensional training vector group based on a Gradient Boosting Decision Tree (GBDT) algorithm to obtain a corresponding decision tree,

$$T(x; \theta_m) ,$$

where θ_m is a parameter of the decision tree;

perform linear combining the decision trees to obtain a linear combination tree

$$f_M(x) = \sum_{m=1}^m T(x; \theta_m) ,$$

wherein a cost function of the linear combination tree is

$$f(x) = l(h(x, D), Y) ,$$

wherein the $h(x, D)$ is a hypothesis function, which is a decision result of the decision tree, and a first-order expansion of a Taylor formula of the cost function $f(x)$ is:

$$l(H(x_{t+1})) = l(H(x_t) + h(x_{t+1})) \approx l(H(x_t)) + \nabla l(H(x_t))h(x_{t+1})$$

$$H(x_t) = \sum_{i=1}^t h(x_i)$$

wherein $H(x_t)$ is a weighted sum of the first t decision trees,

$$H(x_{t+1}) = H(x_t) - \gamma \nabla l(H(x_t))$$

is a steepest descent iterative formula,

and

$$h(x_{t+1}) = \nabla l(H(x_t))$$

is a gradient of the hypothesis function; and

obtaining the AI risk control engine according to the linear combination tree and the cost function.

16. The credit evaluation device according to claim 13, wherein the step of acquiring, when a loan request is received, pre-loan user data of a loan user corresponding to the loan request, and inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation comprises:

when a loan request is received, generating a corresponding data acquisition request according to a user identifier and an authorization grant comprised in the loan request, and sending the data acquisition request to a data management system to obtain corresponding pre-loan user data; and

receiving the pre-loan user data fed back by the data management system, and inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation.

17. A computer readable storage medium, having a credit evaluation program stored thereon, wherein when the credit evaluation program is executed by a processor, the following steps are implemented:

acquiring historical credit data, and constructing an AI risk control engine according to the historical credit data;

when a loan request is received, acquiring pre-loan user data of a loan user corresponding to the loan request, and inputting the pre-loan user data to a pre-set expert engine and the AI risk control engine respectively for credit evaluation; and

acquiring an expert evaluation conclusion of the pre-set expert engine and an AI evaluation conclusion of the AI risk control engine, and generating a corresponding decision and suggestion according to the expert evaluation conclusion and the AI evaluation conclusion;

wherein the historical credit data comprises historical pre-loan data and historical post-loan data,

the step of acquiring historical credit data, and constructing an AI risk control engine according to the historical credit data comprises:

using the historical pre-loan data and the historical post-loan data as an input training set and an output training set respectively, and training an initial machine learning model based on the input training set and the output training set to obtain an AI risk control engine.