

CLAIMS

1. A method for deep learning-based recommendation, comprising:

respectively obtaining related information of a target user and related information of a target item, the related information comprising one or more of information related to an operation of the user, or information related to an operated item;

respectively using at least two sub-models in an integrated model to obtain, based on the related information of the target user and the related information of the target item, operating probabilities corresponding to the at least two sub-models, wherein the operating probability is used for indicating a probability, obtained based on one sub-model, about the target user operating the target item, and the integrated model comprises at least two sub-models;

obtaining, based on the operating probabilities corresponding to the at least two sub-models, a target probability about the target user operating the target item, wherein each sub-model corresponds to one model weight value, and the higher the model weight value is, the greater effect the sub-model has on item recommendation; and

recommending the target item to the target user based on the target probability.

2. The method according to claim 1, wherein the related information of the target user comprises: history information about a historical item being operated by the target user, the historical item comprising at least one item operated by the target user;

and/or

the related information of the target item comprises history information about the target item being operated by a historical user, the historical user comprising at least one user who operated the target item.

3. The method according to claim 1 or 2, wherein the respectively using at least two sub-models in an integrated model to obtain, based on the related information of the

target user and the related information of the target item, operating probabilities corresponding to the at least two sub-models comprises:

using the sub-models to respectively vectorize the related information of the target user and the related information of the target item to obtain user vectors and item vectors; and

obtaining the operating probabilities based on the user vectors and the item vectors.

4. The method according to claim 3, wherein the obtaining the operating probabilities based on the user vectors and the item vectors comprises:

calculating dot products of the user vectors and the item vectors to obtain operate values, and obtaining the operating probabilities based on the operate values.

5. The method according to any one of claims 1 to 4, wherein the obtaining, based on the operating probabilities corresponding to the at least two sub-models, a target probability about the target user operating the target item comprises:

respectively calculating products of the operating probabilities and model weight values of the sub-models corresponding to the operating probabilities; and

adding the products corresponding to the at least two operating probabilities to obtain a target probability about the target user operating the target item.

6. The method according to any one of claims 1 to 5, wherein the recommending the target item to the target user based on the target probability comprises:

in response to the target probability being greater than or equal to a preset threshold, recommending the target item corresponding to the target probability to the target user; and

in response to the target probability being less than a preset threshold, recommending no target item corresponding to the target probability to the target user.

7. The method according to any one of claims 1 to 6, wherein the integrated model is obtained by training a relation between at least two sub-models.

8. The method according to claim 7, wherein a training mode for the integrated model comprises:

training the integrated model based on a historical user and a historical item, wherein a historical probability about the historical user operating the historical item is known.

9. The method according to claim 8, wherein the training the integrated model based on a historical user and a historical item comprises:

establishing a historical vector corresponding to the historical user and the historical item based on the historical user and the historical item;

decomposing, using the integrated model, the historical vector to obtain at least one sample user vector and at least one sample item vector;

obtaining a predicted probability based on the sample user vector and the sample item vector, the predicted probability indicating a probability about the historical user operating the historical item predicted by the integrated model; and

training the integrated model based on the predicted probability and the historical probability.

10. The method according to claim 9, wherein the decomposing, using the integrated model, the historical vector to obtain at least one sample user vector and at least one sample item vector comprises:

decomposing, using an initial integrated model, the historical vector to obtain at least one sample user vector and at least one sample item vector, the initial integrated model comprising one sub-model.

11. The method according to claim 10, wherein the obtaining a predicted probability

based on the sample user vector and the sample item vector comprises:

calculating, using the initial integrated model, a dot product of the sample user vector and the sample item vector to obtain a predicted value about the historical user clicking the historical item, and obtaining a predicted probability based on the predicted value.

12. The method according to any one of claims 9 to 11, wherein the training the integrated model based on the predicted probability and the historical probability comprises:

allocating, according to a difference between the predicted probability and the historical probability, data weight values for the historical user and the historical item corresponding to the predicted probability, wherein the greater the difference is, the greater the data weight values are; and

iteratively training the integrated model based on the sample user vector and the sample item vector combined with the data weight values.

13. The method according to claim 12, where the iteratively training the integrated model based on the sample user vector and the sample item vector combined with the data weight values comprises:

adding one sub-model to the initial integrated model to constitute a first integrated model;

calculating, using the first integrated model and in combination with the data weight values, a dot product of the sample user vector and the sample item vector to obtain a first predicted value about the historical user clicking the historical item, and obtaining a first predicted probability based on the first predicted value;

iterative executing: according to a first difference between the first predicted probability and the historical probability, allocating model weight values for the at least two sub-models in the first integrated model based on the first difference, and allocating first data weight values for the historical user and the historical item

corresponding to the first predicted probability based on the first difference; and

adding one sub-model to the first integrated model to constitute a second integrated model to substitute the first integrated model, using the second integrated model as the first integrated model, calculating, using the first integrated model and in combination with the first data weight values, a dot product of the sample user vector and the sample item vector to obtain a first predicted value about the historical user clicking the historical item, and obtaining a first predicted probability based on the first predicted value until satisfying a preset convergence condition.

14. The method according to claim 13, wherein the satisfying a preset convergence condition comprises:

the first difference between the first predicted probability and the historical probability is less than a preset difference.

15. An apparatus for deep learning-based recommendation, comprising:

an information obtaining unit, configured to respectively obtain related information of a target user and related information of a target item, the related information comprising one or more of information related to an operation of the user, or information related to an operated item;

a probability obtaining unit, configured to respectively use at least two sub-models in an integrated model to obtain, based on the related information of the target user and the related information of the target item, operating probabilities corresponding to the at least two sub-models, wherein the operating probability is used for indicating a probability, obtained based on one sub-model, about the target user operating the target item, and the integrated model comprises at least two sub-models;

a probability synthesis unit, configured to obtain, based on the operating probabilities corresponding to the at least two sub-models, a target probability about the target user operating the target item, wherein each sub-model corresponds to one

model weight value, and the higher the model weight value is, the greater effect the sub-model has on item recommendation; and

a recommending unit, configured to recommend the target item to the target user based on the target probability.

16. An electronic device, comprising: a memory, configured to store executable instructions; and

a processor, configured to communicate with the memory to execute the executable instructions to complete operations of:

respectively obtaining related information of a target user and related information of a target item, the related information comprising one or more of information related to an operation of the user, or information related to an operated item;

respectively using at least two sub-models in an integrated model to obtain, based on the related information of the target user and the related information of the target item, operating probabilities corresponding to the at least two sub-models, wherein the operating probability is used for indicating a probability, obtained based on one sub-model, about the target user operating the target item, and the integrated model comprises at least two sub-models;

obtaining, based on the operating probabilities corresponding to the at least two sub-models, a target probability about the target user operating the target item, wherein each sub-model corresponds to one model weight value, and the higher the model weight value is, the greater effect the sub-model has on item recommendation; and

recommending the target item to the target user based on the target probability.

17. A computer storage medium for storing computer-readable instructions, wherein the instructions are executed to implement operations of a method for deep learning-based recommendation according to any one of claims 1 to 14.

18. A computer program, comprising computer-readable codes, wherein when the computer-readable codes run in a device, a processor in the device executes instructions for implementing a method for deep learning-based recommendation according to any one of claims 1 to 14.