

CLAIMS

What is claimed is:

1. A system comprising:

- a non-transitory memory storing instructions; and
- one or more hardware processors coupled to the non-transitory memory and configured to read the instructions from the non-transitory memory to cause the system to perform operations comprising:
 - training one or more nodes for each of a plurality of ML model layers of a machine learning (ML) model for predicting a plurality of predictive scores using training data from a plurality of entities and a tree-based algorithm training, wherein the training comprises at least one of applying a plurality of weights to the one or more nodes, recursively retraining the one or more nodes, or receiving feedback for adjusting values for the one or more nodes;
 - accessing, for an entity, a credit account that provides an available credit for electronic transaction processing via the system;
 - determining a global balance of funds available to the entity from an additional account with a financial entity;
 - determining an account staleness factor associated with a time since a last update of the global balance of the funds available to the entity from the additional account;
 - accessing the ML model comprising the plurality of ML model layers each having the one or more nodes, wherein an input layer of the plurality of ML model layers comprises a plurality of features extractable from 1) the global balance and 2) the account staleness factor;
 - calculating, using the ML model and based on the plurality of features associated with the global balance and the account staleness factor, a predictive score for a delinquency by the entity at a closing time for a billing cycle associated with the available credit for the credit account, and wherein the predictive score is based on one or more risk factors for the ML model;
 - dynamically adjusting the available credit for the credit account based on the balance forecast;
 - detecting, over a period of time, usage of the available credit by the entity;
 - retraining the ML model based on the detected usage, wherein the retraining comprises:

modifying at least one value for at least one of the one or more nodes based on the detected usage or a feedback from the entity based on the dynamically adjusted available credit, and

adjusting the ML model for a performance improvement based on the at least one modified value;

receiving an update to the global balance of the funds;

updating the account staleness factor to a current time of receiving the update;

recalculating, using the ML model, the predictive score for the entity based on the update and the updated account staleness factor; and

dynamically readjusting the available credit based on the recalculated predictive score.

2. The system of claim 1, wherein the update is received, and the predictive score is recalculated, at a time closer to a closing time for the billing cycle than a time when the predictive score is calculated for dynamically adjusting the available credit.

3. The system of claim 2, wherein the predictive score further comprises a predictive confidence interval, and wherein the available credit is dynamically adjusted when the recalculated predictive score is outside the predictive confidence interval when the available credit was last set.

4. The system of claim 2, wherein the predictive score further comprises a predictive confidence interval, and wherein the predictive score is reduced to a smaller range at the closing time than the time when the predictive score is calculated.

5. The system of claim 1, wherein the ML model is trained based on a plurality of additional global balances and a plurality of spending behaviors for the plurality of entities.

6. The system of claim 5, wherein prior to training the ML model, the operations further comprise: removing at least one outlier transaction from the plurality of spending behaviors for the plurality of entities.

7. The system of claim 1, wherein the ML model uses one of a gradient boosting machine model or an XG boost model.

8. The system of claim 1, wherein the global balance of the funds and the account staleness factor are determined using an integration with a computing system for the financial entity that retrieves data for the additional account at periodic time intervals.

9. A method comprising:

training one or more nodes for each of a plurality of ML model layers of a machine learning (ML) model for predicting a plurality of predictive scores using training data from a plurality of entities and a tree-based algorithm training, wherein the training comprises at least one of applying a plurality of weights to the one or more nodes, recursively retraining the one or more nodes, or receiving feedback for adjusting values for the one or more nodes;

accessing, for an entity, a credit account that provides an available credit for electronic transaction processing via a credit provider system;

determining a balance of funds available to the entity from an additional account with a financial entity;

determining an account staleness factor associated with a time since a last update of the balance of the funds available to the entity from the additional account;

accessing the ML model comprising the plurality of ML model layers each having the one or more nodes, wherein an input layer of the plurality of ML model layers comprises a plurality of features extractable from 1) the balance and 2) the account staleness factor;

calculating, using the ML model and based on the plurality of features associated with the balance and the account staleness factor, a balance forecast for the entity at a closing time for a billing cycle associated with the available credit for the credit account, and wherein the balance forecast comprises a predictive confidence interval at the closing time for the balance based on one or more risk factors for the ML model;

dynamically adjusting the available credit for the credit account based on the balance forecast;

detecting, over a period of time, usage of the available credit by the entity;

retraining the ML model based on the detected usage, wherein the retraining comprises:

modifying at least one value for at least one of the one or more nodes based on the detected usage or a feedback from the entity based on the dynamically adjusted available credit, and

adjusting the ML model for a performance improvement based on the at least one modified value;

receiving an update to the balance of the funds;
updating the account staleness factor to a current time of receiving the update;
recalculating, using the ML model, the predictive score for the entity based on the update and the updated account staleness factor; and
dynamically readjusting the available credit based on the recalculated predictive score.

10. The method of claim 9, wherein the update is received, and the balance forecast is recalculated, at a time closer to a closing time for the billing cycle than a time when the balance forecast is calculated for dynamically adjusting the available credit.

11. The method of claim 10, wherein the predictive confidence interval further comprises a predictive score, and wherein the available credit is dynamically adjusted when the predictive score is outside the predictive confidence interval when the available credit was last set.

12. The method of claim 10, wherein the predictive confidence interval further comprises a predictive score, and wherein the predictive score is reduced to a smaller range at the closing time than the time when the predictive score is calculated.

13. The method of claim 9, wherein the ML model is trained based on a plurality of additional balances and a plurality of spending behaviors for the plurality of entities.

14. The method of claim 13, wherein prior to training the ML model, the method further comprises:

removing at least one outlier transaction from the plurality of spending behaviors for the plurality of entities.

15. The method of claim 9, wherein the ML model uses one of an exponential smoothing model or an XG boost model.

16. The method of claim 9, wherein the balance of the funds and the account staleness factor are determined using an integration with a computing system for the financial entity that retrieves data for the additional account at periodic time intervals.

17. A non-transitory machine-readable medium having stored thereon machine-readable instructions executable to cause a machine to perform operations comprising:

- training one or more nodes for each of a plurality of ML model layers of a machine learning (ML) model for predicting a plurality of predictive scores using training data from a plurality of entities and a tree-based algorithm training, wherein the training comprises at least one of applying a plurality of weights to the one or more nodes, recursively retraining the one or more nodes, or receiving feedback for adjusting values for the one or more nodes;

- accessing, for an entity, a credit account that provides an available credit for electronic transaction processing via a credit provider system;

- determining a global balance of funds available to the entity from an additional account with a financial entity;

- determining an account staleness factor associated with a time since a last update of the global balance of the funds available to the entity from the additional account;

- accessing the ML model comprising the plurality of ML model layers each having the one or more nodes, wherein an input layer of the plurality of ML model layers comprises a plurality of features extractable from 1) the global balance and 2) the account staleness factor;

- calculating, using the ML model and based on the plurality of features associated with the global balance and the account staleness factors, a balance forecast for the entity at a closing time for a billing cycle associated with the available credit for the credit account, and wherein the balance forecast comprises a predictive confidence interval at the closing time for the global balance based on one or more risk factors for the ML model;

- dynamically adjusting the available credit for the credit account based on the balance forecast;

- detecting, over a period of time, usage of the available credit by the entity; and

- retraining the ML model based on the detected usage, wherein the retraining comprises:

- modifying at least one value for at least one of the one or more nodes based on the detected usage or a feedback from the entity based on the dynamically adjusted available credit, and

- adjusting the ML model for a performance improvement based on the at least one modified value;

- receiving an update to the global balance of the funds;

- updating the account staleness factor to a current time of receiving the update;

recalculating, using the ML model, the predictive score for the entity based on the update and the updated account staleness factor; and
dynamically readjusting the available credit based on the recalculated predictive score.

18. The system of claim 1, wherein the operations further comprise:

receiving a change to an expense rate of the funds available to the entity,
wherein the predictive score is further recalculated based on the change to the expense rate.

19. The method of claim 9, further comprising:

receiving a change to an expense rate of the funds available to the entity,
wherein the predictive score is further recalculated based on the change to the expense rate.

20. The non-transitory machine-readable medium of claim 17, wherein the operations further comprise:

receiving a change to an expense rate of the funds available to the entity,
wherein the predictive score is further recalculated based on the change to the expense rate.

21. The non-transitory machine-readable medium of claim 17, wherein the ML model is trained based on a plurality of additional global balances and a plurality of spending behaviors for the plurality of entities, and wherein the operations further comprise:

removing at least one outlier transaction from the plurality of spending behaviors for the plurality of entities.

22. The non-transitory machine-readable medium of claim 17, wherein the update is received, and the predictive score is recalculated, at a time closer to a closing time for the billing cycle than a time when the predictive score is calculated for dynamically adjusting the available credit, wherein the predictive score further comprises a predictive confidence interval, and wherein the predictive score is reduced to a smaller range at the closing time than the time when the predictive score is calculated.