

WHAT IS CLAIMED IS

1. A computer-implemented method, comprising:
 - receiving, with at least one processor, at least one transaction authorization request for at least one transaction;
 - in response to receiving the at least one transaction authorization request, loading, with the at least one processor, at least one encoded state of a stateful machine learning model from a memory;
 - decoding, with the at least one processor, the at least one encoded state by passing each encoded state of the at least one encoded state through a decoder network to provide at least one decoded state;
 - generating, with the at least one processor, at least one updated state and an output for the at least one transaction by inputting at least a portion of the at least one transaction authorization request and the at least one decoded state into the stateful machine learning model;
 - encoding, with the at least one processor, the at least one updated state output by the stateful machine learning model by passing each updated state of the at least one updated state through an encoder network to provide at least one encoded updated state; and
 - storing, with the at least one processor, the at least one encoded updated state in the memory,
 - wherein at least one of the encoder network or decoder network are co-trained with at least part of the stateful machine learning model.
2. The computer-implemented method of claim 1, wherein storing the at least one encoded updated state in the memory comprises replacing the at least one encoded state with the at least one encoded updated state in the memory.
3. The computer-implemented method of claim 1, wherein a size of the at least one encoded state is equal to or smaller than a quarter of a size of the at least one decoded state.

4. The computer-implemented method of claim 1, wherein the at least one encoded state comprises a cell state and a hidden state, and wherein the stateful machine learning model is a long short-term memory model.

5. The computer-implemented method of claim 1, wherein loading the at least one encoded state from memory comprises identifying the at least one encoded state associated with at least one of the following, based on the at least one transaction: a payment device identifier; an account identifier; a payment device holder identifier; or any combination thereof.

6. The computer-implemented method of claim 5, wherein the stateful machine learning model is a fraud detection model, and wherein the output generated for the at least one transaction is a likelihood of fraud for the at least one transaction based on a transaction history associated with at least one of the payment device identifier, the account identifier, the payment device holder identifier, or any combination thereof.

7. The computer-implemented method of claim 6, further comprising regenerating, with the at least one processor, the at least one updated state in response to, and in real-time with, receiving each transaction authorization request of a plurality of ongoing transaction authorization requests.

8. A system comprising a server comprising at least one processor, the server programmed or configured to:

receive at least one transaction authorization request for at least one transaction;

in response to receiving the at least one transaction authorization request, load at least one encoded state of a stateful machine learning model from a memory;

decode the at least one encoded state by passing each encoded state of the at least one encoded state through a decoder network to provide at least one decoded state;

generate at least one updated state and an output for the at least one transaction by inputting at least a portion of the at least one transaction authorization request and the at least one decoded state into the stateful machine learning model;

encode the at least one updated state output by the stateful machine learning model by passing each updated state of the at least one updated state through an encoder network to provide at least one encoded updated state; and

store the at least one encoded updated state in the memory,

wherein at least one of the encoder network or decoder network are co-trained with at least part of the stateful machine learning model.

9. The system of claim 8, wherein storing the at least one encoded updated state in the memory comprises replacing the at least one encoded state with the at least one encoded updated state in the memory.

10. The system of claim 8, wherein a size of the at least one encoded state is equal to or smaller than a quarter of a size of the at least one decoded state.

11. The system of claim 8, wherein the at least one encoded state comprises a cell state and a hidden state, and wherein the stateful machine learning model is a long short-term memory model.

12. The system of claim 8, wherein loading the at least one encoded state from memory comprises identifying the at least one encoded state associated with at least one of the following, based on the at least one transaction: a payment device identifier; an account identifier; a payment device holder identifier; or any combination thereof.

13. The system of claim 12, wherein the stateful machine learning model is a fraud detection model, and wherein the output generated for the at least one transaction is a likelihood of fraud for the at least one transaction based on a transaction history associated with at least one of the payment device identifier, the account identifier, the payment device holder identifier, or any combination thereof.

14. The system of claim 13, wherein the server is further programmed or configured to regenerate the at least one updated state in response to, and in real-time with, receiving each transaction authorization request of a plurality of ongoing transaction authorization requests.

15. A computer program product comprising at least one non-transitory computer-readable medium including program instructions stored thereon that, when executed by at least one processor, cause the at least one processor to:

receive at least one transaction authorization request for at least one transaction;

in response to receiving the at least one transaction authorization request, load at least one encoded state of a stateful machine learning model from a memory;

decode the at least one encoded state by passing each encoded state of the at least one encoded state through a decoder network to provide at least one decoded state;

generate at least one updated and an output for the at least one transaction by inputting at least a portion of the at least one transaction authorization request and the at least one decoded state into the stateful machine learning model;

encode the at least one updated state output by the stateful machine learning model by passing each updated state of the at least one updated state through an encoder network to provide at least one encoded updated state; and

store the at least one encoded updated state in the memory,

wherein at least one of the encoder network or decoder network are co-trained with at least part of the stateful machine learning model.

16. The computer program product of claim 15, wherein storing the at least one encoded updated state in the memory comprises replacing the at least one encoded state with the at least one encoded updated state in the memory.

17. The computer program product of claim 15, wherein the at least one encoded state comprises a cell state and a hidden state, and wherein the stateful machine learning model is a long short-term memory model.

18. The computer program product of claim 15, wherein loading the at least one encoded state from memory comprises identifying the at least one encoded state associated with at least one of the following, based on the at least one transaction: a payment device identifier; an account identifier; a payment device holder identifier; or any combination thereof.

19. The computer program product of claim 18, wherein the stateful machine learning model is a fraud detection model, and wherein the output generated for the at least one transaction is a likelihood of fraud for the at least one transaction based on a transaction history associated with at least one of the payment device identifier, the account identifier, the payment device holder identifier, or any combination thereof.

20. The computer program product of claim 19, wherein the program instructions further cause the at least one processor to regenerate the at least one updated state in response to, and in real-time with, receiving each transaction authorization request of a plurality of ongoing transaction authorization requests.