processor: and/or a combination of servers and/or processors. For example, as used in the specification and the claims, a first server and/or a first processor that is recited as performing a first step or function may refer to the same or different server and/or a processor recited as performing a second step or function.

[0059] Non-limiting embodiments or aspects of the present disclosure are directed to systems, methods, and computer program products for generating synthetic graphs that simulate real-time payment transactions. In some non-limiting embodiments or aspects, a computer-implemented method may include a graph generation system that generates a base payment graph that includes a plurality of nodes and a plurality of edges connecting the plurality of nodes, where each node represents an entity and each edge represents a probability that a real-time payment transaction may be conducted involving two entities that are connected by the edge and the real-time payment transaction is artificially created, generate a plurality of dynamic payment graphs based on the base payment graph, inserts patterns representing adversarial activity into the plurality of dynamic payment graphs, and performs an action associated with a machine learning technique using the plurality of dynamic payment graphs.

[0060] In this way, the graph generation system may provide a dataset that represents actual real-time payment transactions. Additionally, machine learning techniques can be developed to provide risk management and decision making with regard to real-time payment transactions.

[0061] Referring now to FIG. 1, FIG. 1 is a diagram of an example environment 100 in which devices, systems. and/or methods, described herein, may be implemented. As shown in FIG. 1, environment 100 includes graph generation system 102, machine learning implementation system 104, user device 106, and communication network 108. Graph generation system 102, machine learning implementation system 104, and/or user device 106 may interconnect (e.g., establish a connection to communicate) via wired connections, wireless connections, or a combination of wired and wireless connections.

[0062] Graph generation system 102 may include one or more computing devices configured to communicate with machine learning implementation system 104 and/or user device 106 via communication network 108. For example, graph generation system 102 may include a server, a group of servers, and/or other like devices. In some non-limiting embodiments or aspects. graph generation system 102 may be associated with a transaction service provider system, as described herein.

an individual, such as a customer, a business, such as a merchant, and/or the like) or an account of an entity. In some non-limiting embodiments or aspects, each edge may include parameters that represent a probability that a real-time payment transaction may be conducted involving the two entities that are connected by the edge. The real-time payment transaction may include an artificially real-time payment transaction. For example, the real-time payment transactionmay include transaction data that is based on a payment transaction that took place in the real-world, however, the transaction data is not the same as transaction data associated with the payment transaction that took place in the real-world.

[0077] In some non-limiting embodiments or aspects, graph generation system 102 may assign graph attributes to the base payment graph to simulate a real-world payment graph. For example, graph generation system 102 may assign the graph attributes to the base payment graph where the graph attributes are based on realistic graph statistics regarding real-time payment transactions. In some non-limiting embodiments or aspects, graph generation system 102 may receive the graph attributes from user device 106.

[0078] In some non-limiting embodiments or aspects, graph generation system 102 may assign a plurality of account parameters to each node of the plurality of nodes. For example, graph generation system 102 may assign an account number, an account identifier, a bank identifier, a routing number, and/or the like, to each node. In some non-limiting embodiments or aspects, graph generation system 102 may assign a plurality of transaction parameters to each edge of the plurality of edges. For example, graph generation system 102 may assign a probability parameter to each edge of the plurality of edges. In some non-limiting embodiments or aspects, the probability parameter may indicate a probability that a real-time payment transaction may occur involving two entities that are connected by the edge. Additionally or alternatively, graph generation system 102 may assign an interaction parameter to each edge of the plurality of edges. For example, graph generation system 102 may assign a parameter indicating the edge is associated with a customer-to-customer (C2C) interaction, a customer-to-business (C2B) interaction, a business-to-customer (B2C) interaction, or a business-to-business (B2B) interaction. In some non-limiting embodiments or aspects, graph generation system 102 may receive the plurality of account parameters and/or the plurality of transaction parameters from user device 106.