[0004] Patent document 1: Japanese laid-open patent publication No. 2011-204721

Summary of Invention

Technical Problem

[0005] In Patent document 1, the accumulated use time of the polishing pad is determined by accumulating time during which the top ring presses the substrate against the polishing pad to polish the substrate. However, a state of the polishing pad varies not only during polishing of the substrate performed by the top ring, but also during dressing of the polishing pad performed by the dresser or cleaning of the polishing pad performed by the atomizer. Therefore, the state of the polishing pad cannot be determined in detail only by the management of the accumulated use time.

[0006] On the other hand, operating conditions of the top ring, the polishing table, the polishing-fluid supply nozzle, the dresser, and the atomizer included in the substrate processing apparatus are factors that affect the state of the polishing pad. These operating conditions act complexly and mutually on the polishing pad. Therefore, it is difficult to accurately analyze the effects of the respective operating conditions on the state of the polishing pad.

[0007] In view of the above-mentioned drawbacks, it is an object of the present invention to provide an information processing apparatus, an inference apparatus, a machine-learning apparatus, an information processing method, an inference method, and a machine-learning method capable of appropriately predicting a state of a polishing pad according to operating conditions of a substrate processing apparatus.

Solution to Problem

[0008] In order to achieve the above object, an information processing device according to an embodiment of the present invention, comprises:

an information acquisition section configured to acquire operating condition information as operating conditions under which a substrate processing apparatus operates, the operating condition information including top-ring state information indicating a state of a top ring, polishing-table state information indicating a state of a

polishing table, polishing-fluid-supply-nozzle state information indicating a state of a polishing-fluid supply nozzle, dresser state information indicating a state of a dresser, and atomizer state information indicating a state of an atomizer, the substrate processing apparatus being configured to perform chemical mechanical polishing of a substrate and including the polishing table configured to rotatably support a polishing pad, the top ring configured to press the substrate against the polishing pad, the polishing-fluid supply nozzle configured to supply a polishing fluid onto the polishing pad, the dresser configured to rotatably support a dresser disk and bring the dresser disk into contact with the polishing pad to dress the polishing pad, and the atomizer configured to emit a cleaning fluid to the polishing pad; and

a state prediction section configured to predict polishing-pad state information for the operating condition information by inputting the operating condition information acquired by the information acquisition section to a learning model that has been generated by machine learning that causes the learning model to learn a correlation between the operating condition information and the polishing-pad state information indicating a state of the polishing pad when the substrate processing apparatus operates under the operating conditions indicated by the operating condition information.

Advantageous Effects of Invention

[0009] According to the information processing apparatus of the embodiment of the present invention, the operating condition information including the top-ring state information, the polishing-table state information, the polishing-fluid-supply-nozzle state information, the dresser state information, and the atomizer state information is input to the learning model, so that the polishing-pad state information for the operating condition information can be predicted. Therefore, the state of the polishing pad can be predicted appropriately according to the operating conditions of the substrate processing apparatus.

[0010] Objects, configurations, and effects other than those described above will be made clear in detailed descriptions of the invention described below.

Brief Description of Drawings