

A SYSTEM, APPARATUS AND PROCESSING METHOD SUITABLE FOR PREDICTIVE BASED ANALYSIS OF A STRUCTURE

Field Of Invention

5 The present disclosure generally relates to a system suitable for analyzing a structure such as a pipeline. Specifically, the present disclosure can generally relate to, for example, predictive based analysis of a pipeline. The present disclosure further relates to one or both of an apparatus and a processing method associable to the system.

Background

10 In petroleum engineering industry, it is generally useful to anticipate/identify possibility of issue(s) in connection with, for example, a pipeline structure (i.e., simply referred to as a "pipeline").

An example of an issue is pipeline corrosion.

15 Currently, techniques such as Intelligent Pigging (IP) inspection, In-line inspection (ILI), Field measurement and/or corrosion modelling are used.

However, the present disclosure contemplates that IP inspection and/or ILI need not necessarily
20 be cost effective and/or provide instantaneous/real-time indication of possible corrosion. Additionally, Field measurement may be limited in the sense that such measurement could be limited in area/range of detection and/or could be labor intensive. Moreover, corrosion modeling need not necessarily be comprehensive and/or reliable.

25 Therefore, the present disclosure contemplates that current techniques need not necessarily detect issue(s) associated with, for example, a pipeline in an efficient manner, user friendly manner and/or a suitably comprehensive manner.

The present disclosure contemplates that there is a need for improvement in regard to the
30 aforementioned anticipation/identification of possible issue(s) in association with, for example, a pipeline.

Summary of the Invention

35 In accordance with an aspect of the disclosure, there is provided a system comprising an apparatus coupled to at least one device. The apparatus can include a first module and a second module. The first and second modules can be coupled.

The first module can be configured to one or both of receive and generate one or more input signals (i.e., at least one of receive at least one input signal and generate at least one input signal). The input signal(s) can be associated with one or both of one or more operating parameters associated with a structure (e.g., a pipeline) and one or more target variables associated with a structure (e.g., a pipeline) (i.e., at least one of: at least one operating parameter and at least one target variable, associable with a structure).

The second module can be configured to process the input signal(s) by manner of any one of, or any combination of, the following:

data cleaning;
data wrangling; and
data merging,

to produce one or more output signals which can be communicated to the at least one device for further processing.

That is, the second module can, for example be configured to process the input signal(s) by manner of data cleaning, data wrangling and/or data merging (i.e., at least one of data cleaning, data wrangling and data merging) to produce at least one output signal which can be communicated for further processing.

In one embodiment, the apparatus can further include a third module which can, for example, be coupled to the second module. The output signal(s) can be communicated to the third module from the second module for further transmission from the apparatus to at least one device coupled to the apparatus. The output signal can, for example, be received by the device for machine-learning based processing. For example, the output signal(s) can be communicated for further processing by manner of machine-learning (ML) based processing to generate at least one ML model. The ML based processing can include/be associated with a data normalization stage, a data splitting stage and/or a model training stage (i.e., at least one of a data normalization stage, a data splitting stage and a model training stage). In accordance with an embodiment of the disclosure, during the data splitting stage, a training dataset and/or a testing dataset can be obtained.

In accordance with another aspect of the disclosure, there is provided a processing method which can be suitable for generating at least one output signal communicable for machine-learning (ML) based processing to derive at least one ML model.

Claims

1. A system comprising an apparatus communicatively coupled to at least one device, the apparatus comprising:
 - a first module configured to:
 - at least one of receive at least one input signal and generate at least one input signal, the input signal being associated with at least one of:
 - at least one operating parameter and at least one target variable, associated with a structure,
 - a second module coupled to the first module, the second module configured to process the at least one input signal by manner of at least one of:
 - data cleaning,
 - data wrangling, and
 - data merging,
 - to produce at least one output signal communicable to the at least one device for further processing.
2. The system of claim 1, wherein the apparatus further comprises:
 - a third module coupled to the second module, the output signal being communicable to the third module from the second module for further transmission from the apparatus to the at least one device ,
 - wherein the output signal is receivable by the at least one device for machine-learning based processing.
3. The system of claim 1, wherein the at least one device is configured to process the at least one output signal by manner of machine-learning (ML) based processing to generate at least one ML model.
4. The system of claim 3, wherein the ML based processing includes at least one of:
 - a data normalization stage;
 - a data splitting stage; and
 - a model training stage.
5. The system of claim 4,
 - wherein during the data splitting stage, a training dataset and a testing dataset are obtained.

6. The system of claim 3, wherein the apparatus is further configured to process the at least one input signal by matching with historical inspection data to generate data frames for training the at least one ML model.

7. The system of claim 1, wherein the apparatus is further configured to hypothesize based on domain expert knowledge and/or obtain data from one or more trusted data providers to form the at least one input signal.

8. The system of claim 1, wherein the structure corresponds to a pipeline.

9. A processing method for generating at least one output signal communicable for machine-learning (ML) based processing to derive at least one ML model, the method comprising:

at least one of generating and receiving at least one input signal, the input signal being associated with at least one of:

at least one operating parameter; and

at least one target variable,

associated with a structure;

processing the at least one input signal by manner of at least one of:

data cleaning;

data wrangling; and

data merging,

to produce at least one output signal;

communicating the at least one output signal for machine-learning based processing to derive at least one ML model.