EPRI DATA ANALYTICS CASE

Predictive Health Index for Distribution Service Transformers

The Data Challenge

Continuous health monitoring of distribution service transformers is a rarity because of the lack of inexpensive sensors required to monitor the ever-changing thermal, electromagnetic, and environmental stresses imposed on the transformer. The lack of data and knowledge about the transformer prevents the utility from ascertaining the health condition of the transformer until the transformer fails, resulting in interruption in service to one or more customers.
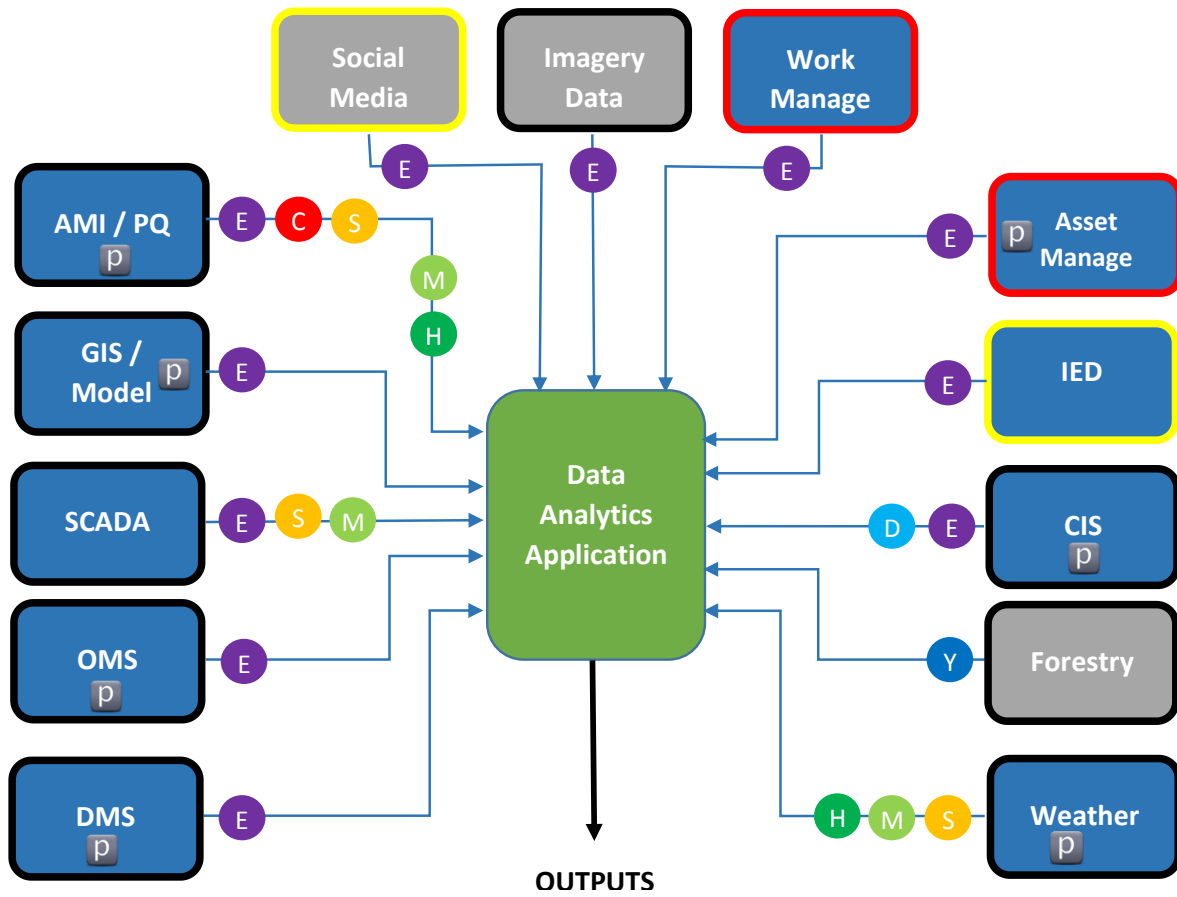
Solution Overview

Basic aging algorithms and thermal models have been developed by different standards bodies, namely IEEE and International Electrotechnical Commission (IEC), and have been widely accepted by the industry. These algorithms and models can be used and modified to access certain health aspects of a service transformer, assign and maintain a health index score, and predict time to perform maintenance on or retire the transformer.

Potential Methods for Solving the Problem

This data analytics case proposes to assign a distribution service transformer a health index based on data-driven solutions. Because the majority of distribution service transformers do not have communications to provide critical feedback data for the data analytics solution, the following potential methods use data from other resources—that is, AMI meter and weather data sets—to assess the health of the regulator. The results from the aging and genetic models would serve as inputs into the health index. Additional health index factors might include the failure rates of other transformers of similar age and manufacturer, environmental factors, outages associated with the service transformer, and other factors that are directly related to the structural design of the transformer.

Available Data Sets

The data sets highlighted in the following figure are available in the EPRI Data Repository to solve this data analytics case.

Social Media

Imagery Data

Work Manage

AMI / PQ
p

GIS / Model
p

SCADA

OMS
p

DMS
p

Data Analytics Application

Asset Manage
p

IED

CIS
p

Forestry

Weather
p

OUTPUTS

Classifications of Data:

Traditional Data Set

New Data Set

Structured Data

Un-structured Data

Format of Data Varies

p Denotes a primary data set used to solve this data analytics case.

Frequency of Measurement

C Cycles

S Seconds

M Minutes

H Hours

D Days

Y Months to Years

E Event Driven