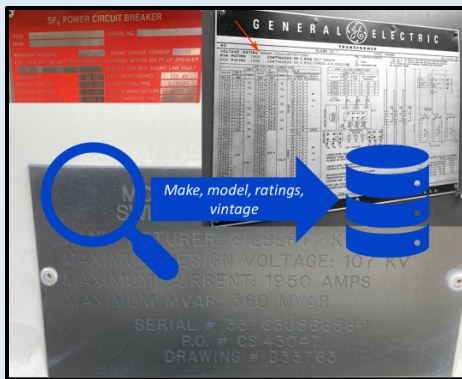


AUTOMATED EXTRACTION OF ASSET INFORMATION FROM NAMEPLATE IMAGES USING ARTIFICIAL INTELLIGENCE AND ADVANCED IMAGE PROCESSING TECHNIQUES



Extracting accurate asset information from nameplates to support asset performance analysis.

PROJECT HIGHLIGHTS

- More accurate and complete asset data enables utilities to perform more effective and targeted inventory and asset management, which may lead to improved efficiency, increased reliability, and reduced costs.

Background, Objectives, and New Learnings

Accurate and complete asset demographic and descriptive data are essential for analysis-based decisions. However, such data are often incorrect or missing from existing utility databases. Asset nameplates are a potential source for the most accurate asset data. However, extraction and recording of the information from the nameplate or an image of the nameplate is a tedious and manual process.

Methods to automatically extract information from nameplate images could provide value to utilities building new or improving existing databases but there are some challenges. There are many formats and types (i.e., shape and layout) of nameplates. Furthermore, image quality: including lighting, angle, and resolution will vary and could affect automated extraction results.

Proposed here is a feasibility study to:

- Collect representative images of nameplates for various assets.
- Identify the discrete tasks that will need to be automated to identify and extract relevant information from nameplate images. Examples may include detecting the edges of the nameplate, identifying the type of nameplate, locating pertinent information, and recognizing the specific characters in identified text.
- Identify potential solutions for these various tasks and evaluate their efficacy.
- Identify specific challenges and gaps in performance where additional research is necessary to achieve the required performance. Develop a Phase 2 plan to make the identified techniques ready for utility use.

Benefits

The public may benefit from the potential of improved quality and reduced cost of service. More accurate and complete asset data may enable utilities to perform more effective and targeted inventory and asset management, which may lead to improved efficiency, increased reliability, and reduced costs.

If successful, the outcomes of this research may help utilities more efficiently extract demographic data from nameplate images. This new learning may be incorporated into EPRI's R&D Program P34 (Transmission Asset Management Analytics). The results are ultimately made available to the public or used for the benefit of the public through the publishing of EPRI reports.

Project Approach and Summary

- Conduct an information exchange session to facilitate discussions with participating utilities to:
 - Identify asset classes of highest interest.
 - Provide guidelines to obtain desired image data.
- Obtain representative nameplate images for these assets from the utilities:
 - This feasibility study intends to focus on up to 5 asset classes (e.g., high voltage circuit breakers, disconnect switches).
 - It is anticipated that, per utility, a minimum of 100 and a maximum of 300 images per asset are desired, with at least 3 different types of nameplates (i.e., shape or layout) with at least 10 different examples per type.
- Evaluate the efficacy and applicability of various techniques to automate extraction of asset information from the nameplate images provided by the utilities:
 - Assess the quality and readability of the nameplate images.
 - Develop approach(es) and determine metrics for evaluating the quality of extracted information. It is anticipated that a variety of artificial intelligence and image processing techniques may be investigated.
 - Test various methods for extraction to understand what level of performance is achievable.
- Identify promising techniques and what additional work might be necessary to make these techniques ready for utility use.

Deliverables

- A project kick-off webcast.
- A report detailing results of a preliminary evaluation of applying automated extraction methodologies to nameplate image data. This report intends to cover:
 - The approach and metrics used to evaluate the quality of extracted information.
 - A list of tools and techniques evaluated.
 - Summary of the performance of these methods.
 - Identification of promising techniques and research directions.
 - A scope of work that documents what work might be necessary to make these techniques ready for utility use.
- Technology transfer workshop at the end of the project to share results.

Price of Project

The project cost estimate for the 12-month duration is \$45k per utility.

Project Status and Schedule

The project is expected to be accomplished within 12 months of project kickoff.

Who Should Join

Utilities seeking to improve the quality of their asset records. Utilities seeking to adopt or enhance data driven decision making.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

Technical Contact

Bhavin Desai at 704.804.1188 (bdesai@epri.com)