

WHAT IS HAL?

HAL is an adaptive design and learning tool for efficient sampling and meta-modeling of "black-box" systems/models.

HAL generates and evaluates initial efficient design points in the system and uses adaptive sampling agents to determine new design points by exploiting information observed from system outputs. In this adaptive process, HAL builds meta-models that act as surrogates to the system for faster evaluation and understanding.

HAL exports its findings to a database and structured files which enable interactive visualization of complex, high-dimensional data to identify driving factors and find areas of interest for further exploration.

HAL is currently employed on model portfolios including the Threat Modeling and Analysis Program (TMAP); Advanced Framework for Simulation, Integration and Modeling (AFSIM); and Shock Wave Physics model (CTH).

HAL

HARNESS FOR ADAPTIVE LEARNING



FEATURES

- HAL's space-filling experimental designs are more efficient than full factorial or fine-grid designs for high-dimensional models
- A variety of machine learning techniques are used and compared to determine best fitting regression/classification meta-models
- Validation and verification are built into the process to ensure full understanding and accurate meta-model representation of the harnessed model
- Data visualization and exploration allow the user to identify and visualize patterns, anomalies, and trends across observed data and meta-models

BENEFITS

- Alleviates the analytic burden of developing experimental designs to explore the sample space (modeling and simulation autopilot for data generation)
- Assesses multiple inter-dependent models to derive their interactions
- Enables rapid exploration of complex models to quickly find areas of interest applicable to a specific question/study

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