



ASK THE EXPERT

How Do I Use SAS® Model Manager?

Sophia Rowland
Product Manager






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Product Manager

Sophia Rowland is responsible for driving product strategy and direction for SAS Model Management. Previously, she was a systems engineer focused on data science and ModelOps applications. Rowland is an alumna of UNC-Chapel Hill, where she studied computer science and psychology, and Duke, where she completed a master's degree in business analytics at the Fuqua School of Business.



Ask the Expert: Getting Started with SAS Model Manager

Sophia Rowland, SAS Model Manager Product Manager



SAS Model Manager

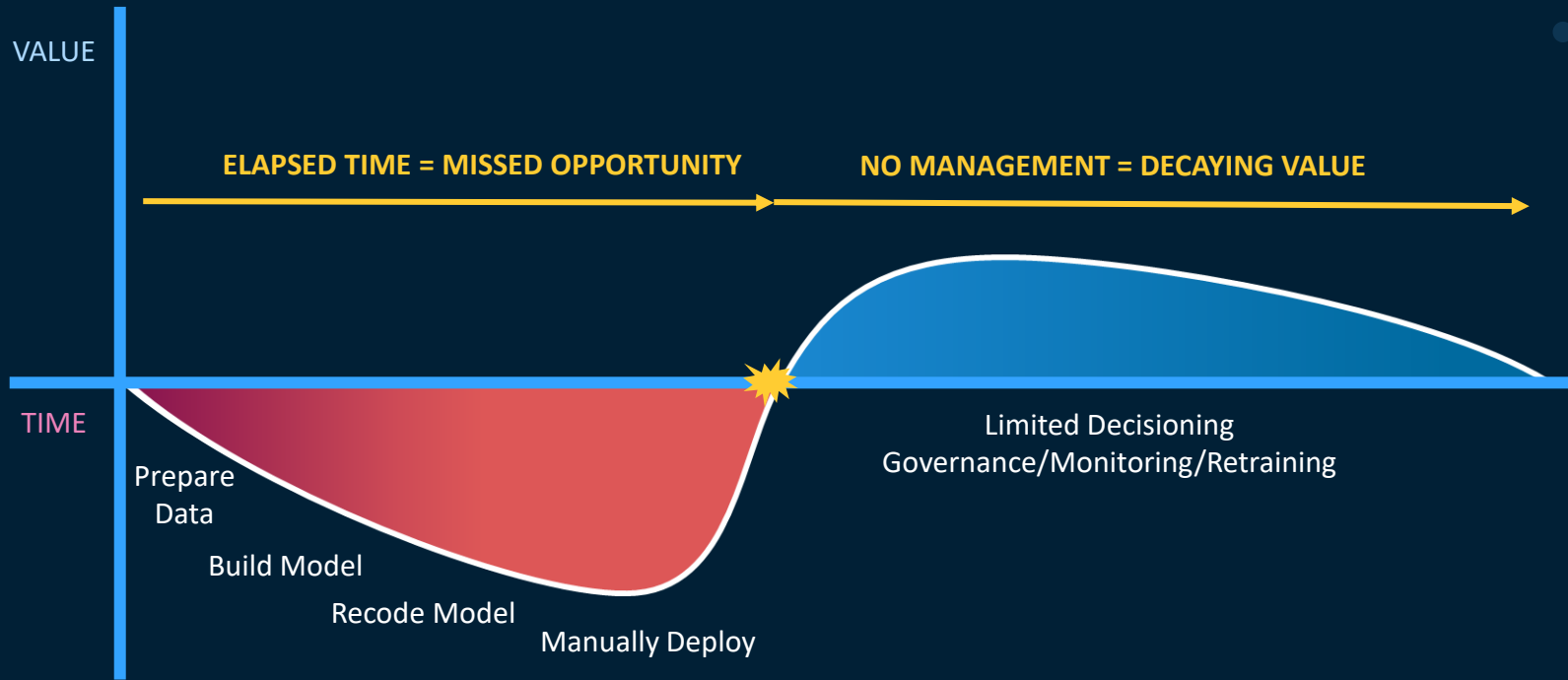
*Build a streamlined
ModelOps process*

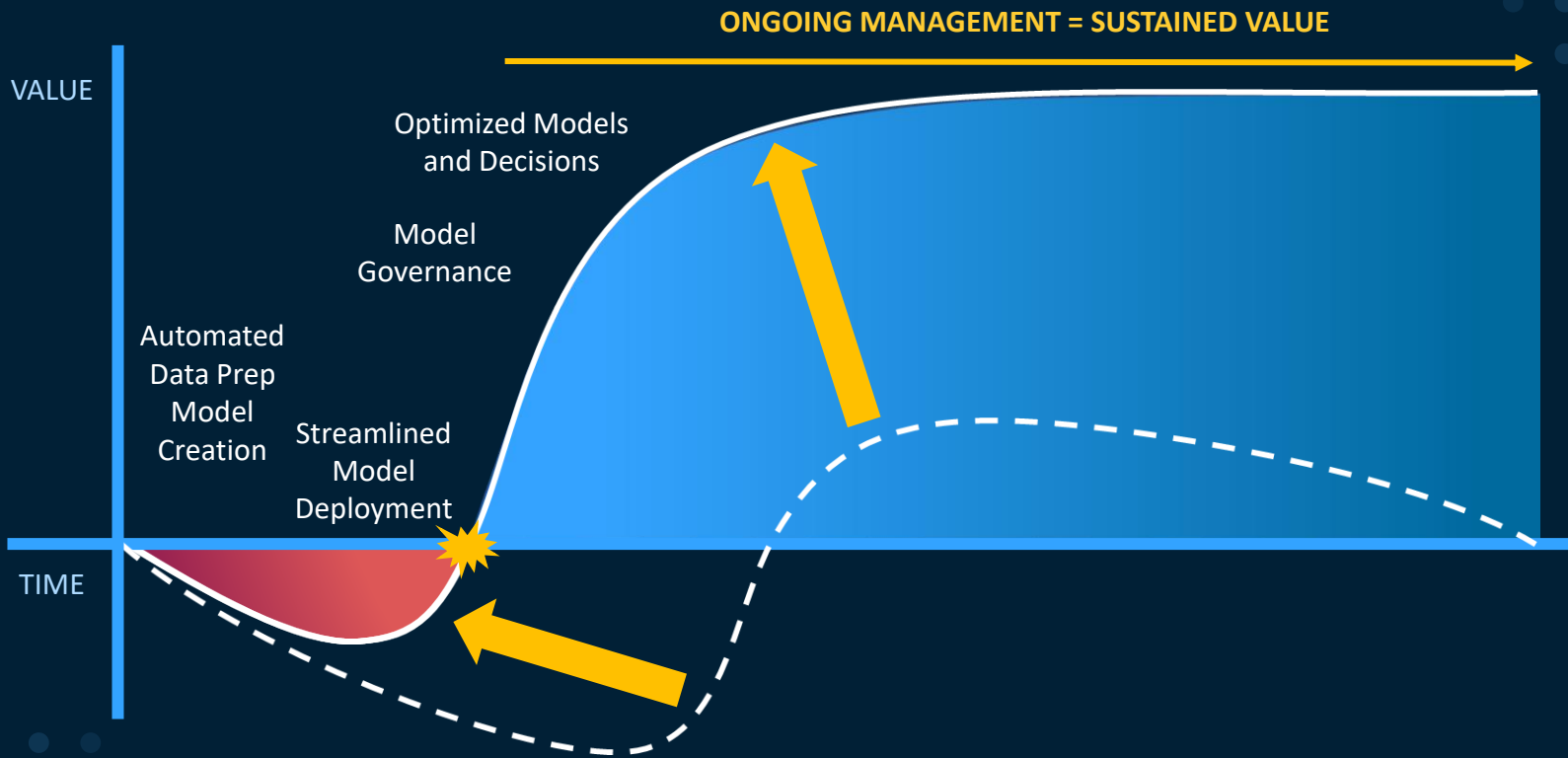
Why is ModelOps needed?

On average, only **53%** of AI/ML projects are **eventually deployed**.
(Gartner 2020)

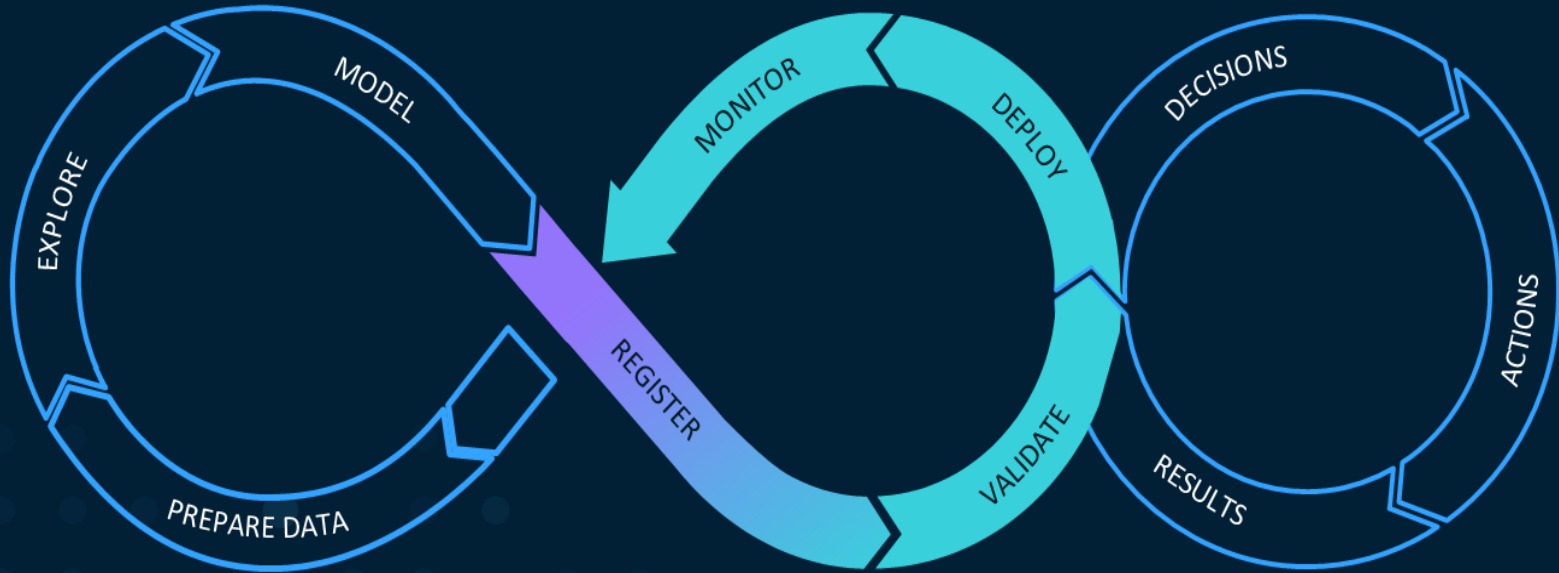
Organizations will **waste time and money** on data science projects that are **not put into production and properly managed**. Their AI transformation will **fail without ModelOps**.

We can activate the **value of analytics** with a framework to **streamline** the deployment and management of **analytical models** and **integrate with rules** for decisioning.





SAS Model Manager



SAS Model Manager



Register

From SAS
Model Studio

From a Local
File

From SAS
Studio

From Python



Validate

Compare
Models

Run a Score
Test



Deploy

Publish a
Model

Use a Published
Model



Monitor

Monitor
Performance



Automate

Complete a
Task



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Manage Models


Manage, deploy, and monitor models with SAS Model Manager.

[New project](#) [Add models](#) ▾



RECENT ITEMS





Sort by: Name ▾



Application Fraud ⋮
Classification
Date modified: Dec 12, 2022 8:48...
Modified by: sasadm


Consumer Complaints ⋮
Text analytics
Date modified: Jul 15, 2022 10:07...
Modified by: sastest1


Credit Card Fraud ⋮
Classification
Date modified: Dec 12, 2022 8:47...
Modified by: sasadm

Credit Card Propensity ⋮
Classification



Decision Tree (Basic Templ... ⋮
Decision tree



Fraud Detection ⋮
Classification

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Join a SAS community

HOW TO

- ▶ [Have Questions About SAS Container Runtime? Ask the Experts!](#)
- ▶ [Easy Deployment and Monitoring for Multinomial Classification Models](#)
- ▶ [Using SASCTL package to deploy and manage MLFlow models - a step by step introduction](#)
- ▶ [Using the SAS Container Runtime for publishing SAS models to Kubernetes on the Azure cloud](#)
- ▶ [ModelOps and DecisionOps for the Modern World](#)

WHAT'S NEW

[Easily Promote and Use Containerized Model Deployments](#)

[Have You Mastered ModelOps? Show Off Your Skills with New Certification](#)

[Creating model publishing destinations using the SAS Viya CLI](#)

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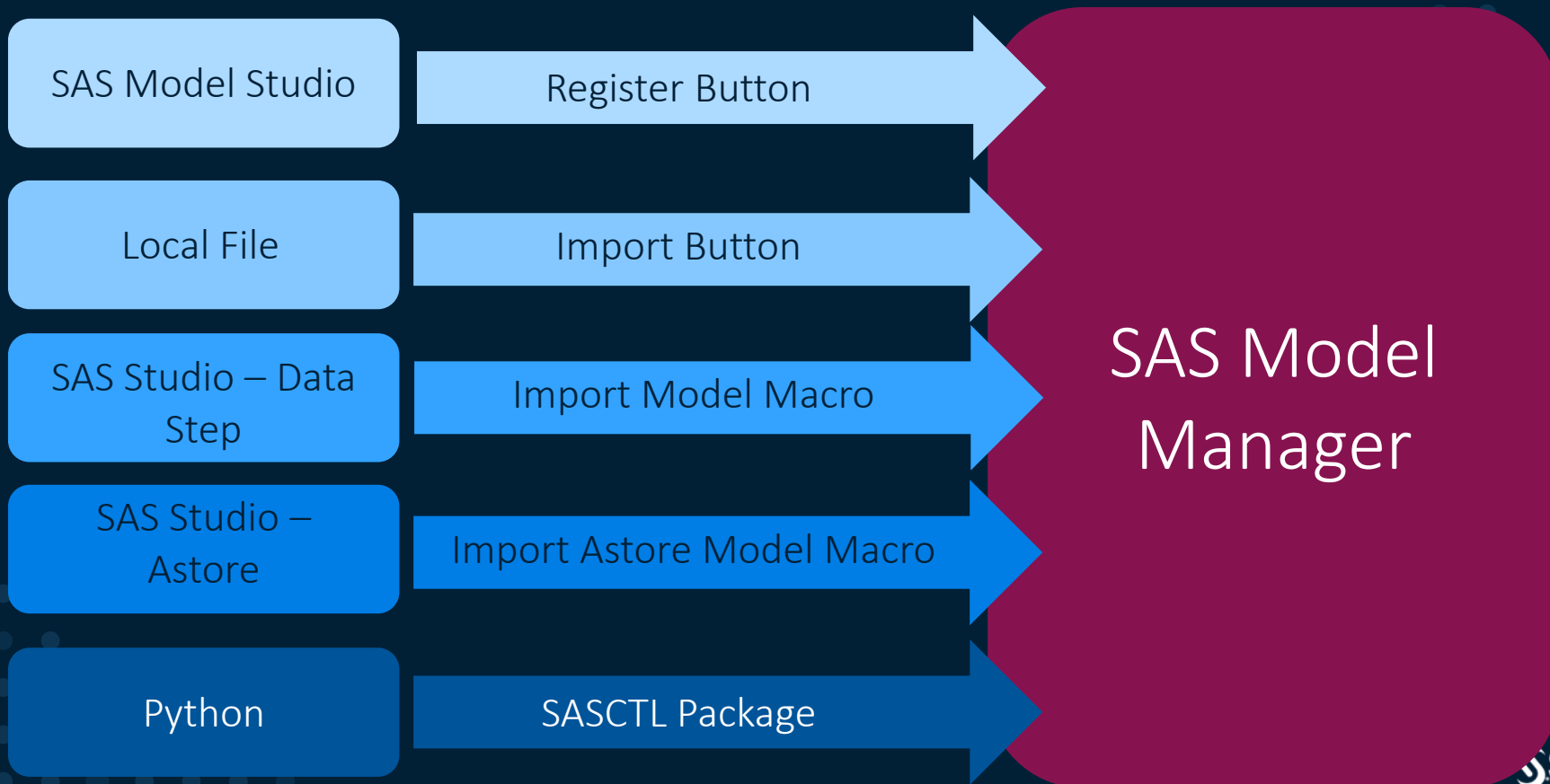


Next Steps

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Registration Fits Model Development



Functionality Depends on Modeling Assets

Model Comparison

Input, Output, & Target Variables and Performance on Training, Testing, & Validation Sets

Scoring

Input, Output, & Target Variables and Score Code

Publishing

Input, Output, & Target Variables and Score Code

Monitoring

Input, Output, & Target Variables; Score Code; and Performance Data

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Welcome

- What's New
- Quick Start Tutorial
- General Usage
- User's Guide
- ▾ Macro Reference
 - Introduction
 - ▾ Model Management Macros
 - Overview
 - [%MM_GET_TOKEN Macro](#)
 - [%MM_CREATE_REPOSITORY Macro](#)
 - [%MM_CREATE_FOLDER Macro](#)
 - [%MM_CREATE_PROJECT Macro](#)
 - [%MM_CREATE_PROJECTVERSION Macro](#)
 - [%MM_IMPORT_MODEL Macro](#)
 - [%MM_IMPORT_ASTORE_MODEL Macro](#)
 - [%MM_MODEL_ADD_JSONFILES Macro](#)
 - [%MM_GET_REPOSITORY_ID Macro](#)
 - [%MM_GET_FOLDER_ID Macro](#)
 - [%MM_GET_PROJECT_ID Macro](#)
 - [%MM_GET_PROJECTVERSION_ID Macro](#)
 - [%MM_GET_MODEL_ID Macro](#)
 - [%MM_GET_FILEURI Macro](#)
 - [%MM_DELETE_REPOSITORY M](#)

Welcome

Welcome to SAS Model Manager

SAS Model Manager enables you to manage, test, publish, validate, and monitor models.

Getting Started

- [About SAS Model Manager](#)
- [Quick Start Tutorial](#)
- [Sample Data and Content for Quick Start \(ZIP\) ↗](#)

Quick Links

- [What's New](#)
- [Accessibility Features](#)
- [SAS Communities ↗](#)

Basic Model Life Cycle Tasks

- 1 Organize your models within a project

[Create a Project](#)

- 2 Add a custom model or import models

[Add Models](#)

- 3 Select models to compare and assess

[Compare Models](#)

- 4 Create and run a scoring test

[Test Models](#)

- 5 Set a champion model for a project

[Set Champion Model](#)

- 6 Publish the champion model to a destination

[Publish Champion Model](#)

- 7 Validate the published champion model

[Validate Champion](#)

- 8 Monitor the performance of a champion model

[Monitor Performance](#)

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Python XGBOOST Machine Learning Pipeline

Next, we will create a pipeline which will take the input variables, impute missing categorical variables, one-hot-encode categorical variables, and train a xgboost model.

```
In [16]: urllib3.disable_warnings()

# Separate target from data preparation process
y = hmeqdf.pop('BAD').values

# Find and notes categorical columns
kinds = np.array([dt.kind for dt in hmeqdf.dtypes])
all_columns = hmeqdf.columns.values
is_cat = kinds == 'O'
cat_cols = all_columns[is_cat]

# Impute missing categorical variables with missing
cat_si_step = ('si', SimpleImputer(strategy='constant', fill_value='MISSING'))

# One hot-encode categorical variables
cat_ohe_step = ('ohe', OneHotEncoder(sparse=False, handle_unknown='ignore'))

# Create ML pipe with imputation, one-hot-encoding, and xgboost
cat_steps = [cat_si_step, cat_ohe_step]
cat_pipe = Pipeline(cat_steps)
cat_transformers = [('cat', cat_pipe, cat_cols)]
ct = ColumnTransformer(transformers=cat_transformers)
ml_pipe = Pipeline([('transform', ct), ('xgb', xgb.XGBClassifier())])
ml_pipe.fit(hmeqdf, y)

# Get predictions
ml_pipe_scored = pd.DataFrame(ml_pipe.predict_proba(hmeqdf), columns=['prob_0', 'prob_1'])
```

This is a simple example, but let's examine our model's accuracy as a sanity check.

```
In [15]: ml_pipe.score(hmeqdf, y)
```

```
Out[15]: 0.8013422818791947
```

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SAS Viya REST APIs

- Getting Started
- Analytics Insights
- Visualization
- Compute
- Data Management
- Decision Management
- Core Services
- Automated Machine Learning
- Support And Feedback

Decision Management

- Model Management
- Model Repository
- Model Publish
- Micro Analytic Score
- Usage Notes

Operations

- Root
- Get a list of top-level links
- Get headers for the service
- Modules**
- Get loaded modules
- Create a module
- Get module
- Get headers for module
- Update a module
- Delete a module
- Get module source
- Get module source

Operations

Root

Contains the operations for the root resource.

Get a list of top-level links

GET /

Returns a list of links to the top-level collections that are surfaced through the API. HEAD is also supported and returns status and headers only.

Responses

Status	Meaning	Description	Schema
200	OK	The request succeeded. A collection of link objects was returned.	Inline

Response Schema

Status Code 200

API

Name	Type	Required	Restrictions	Description
» version	integer	true	none	The version number of the API representation. This is version 1.
» links	[link]	true	none	The API's top-level links.
»» Link	[link]	false	none	A link to a related operation or resource.
»»» method	string	false	none	The HTTP method for the link.
»»» rel	string	true	none	The relationship of the link to the resource.

```
shell javascript python go

import requests
headers = {
    'accept': 'application/vnd.sas.api+json'
}

r = requests.get('https://example.com/microanalyticScore/', headers=headers)

print(r.json())
```

Example responses

List of top-level links

```
{
  "version": 1,
  "links": [
    {
      "method": "GET",
      "rel": "modules",
      "href": "/microanalyticScore/modules",
      "uri": "/microanalyticScore/modules",
      "type": "application/vnd.sas.collection",
      "itemType": "application/vnd.sas.microanalytic.module"
    }
  ]
}
```

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Projects

Hide tiles



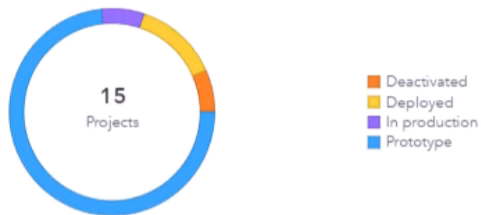
15

Total Number of Projects



8 Projects with Published Models

Projects per Operational Status



Projects per Model Function



Search name



Advanced search

New Project



<input type="checkbox"/>	Name	↑	Published Status	Model Function	Modified By	Date Modified
<input type="checkbox"/>	Application Fraud			Classification	sasadm	Dec 12, 2022 08:48
<input type="checkbox"/>	Ask-the-Expert Demo			Classification	sasadm	Dec 12, 2022 10:01
<input type="checkbox"/>	Consumer Complaints			Text analytics	sastest1	Jul 15, 2022 10:07 A
<input type="checkbox"/>	Credit Card Fraud			Classification	sasadm	Dec 12, 2022 08:47
<input type="checkbox"/>	Credit Card Propensisty			Classification	sastest1	Jul 15, 2022 10:19 A
<input type="checkbox"/>	Example Project			Analytical	sasadm	Dec 12, 2022 09:01
<input type="checkbox"/>	Fraud Detection			Classification	sasadm	Dec 12, 2022 08:54
<input type="checkbox"/>	Image Classification (Rapid Food Demo)			Classification	sasadm	Dec 12, 2022 08:50
<input type="checkbox"/>	Intrusion Detection			Classification	sasadm	Dec 12, 2022 08:52

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Ask-the-Expert Demo

📄 🔗 ↺ ⋮ 1 Close

Models Variables Properties Files Scoring Performance Workflow History



Start Workflow ▾

Name	Status	Started By	Date Started	Date Ended	Description
------	--------	------------	--------------	------------	-------------



No workflows have been started.

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Find your SAS answers

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5,707 Library Articles

1,217 Users online

78 Groups

RECENT SOLUTIONS



- ✓ HOW DO I GET DATA FROM SNOWFLAKE TO SAS
Answered in SAS Programming
- ✓ Help with do loops: keep memory of counter value
Answered in SAS Programming
- ✓ proc format: if-statements doable?
Answered in SAS Programming
- ✓ Add a count column
Answered in SAS Programming

All recent solutions

FEATURED ARTICLE



Time to REST: An Overview of SAS API Use Cases on GitHub



SAS' @joeFurbee provides a window into our API project.

Check it out.

FEATURED WEBINAR



How Do I Get My Data Into and Out of SAS - Slides and On-Demand Recording



Learn how to make data available for use in SAS9 and/or Viya platform Cloud Analytics Services (CAS).

Watch on demand.



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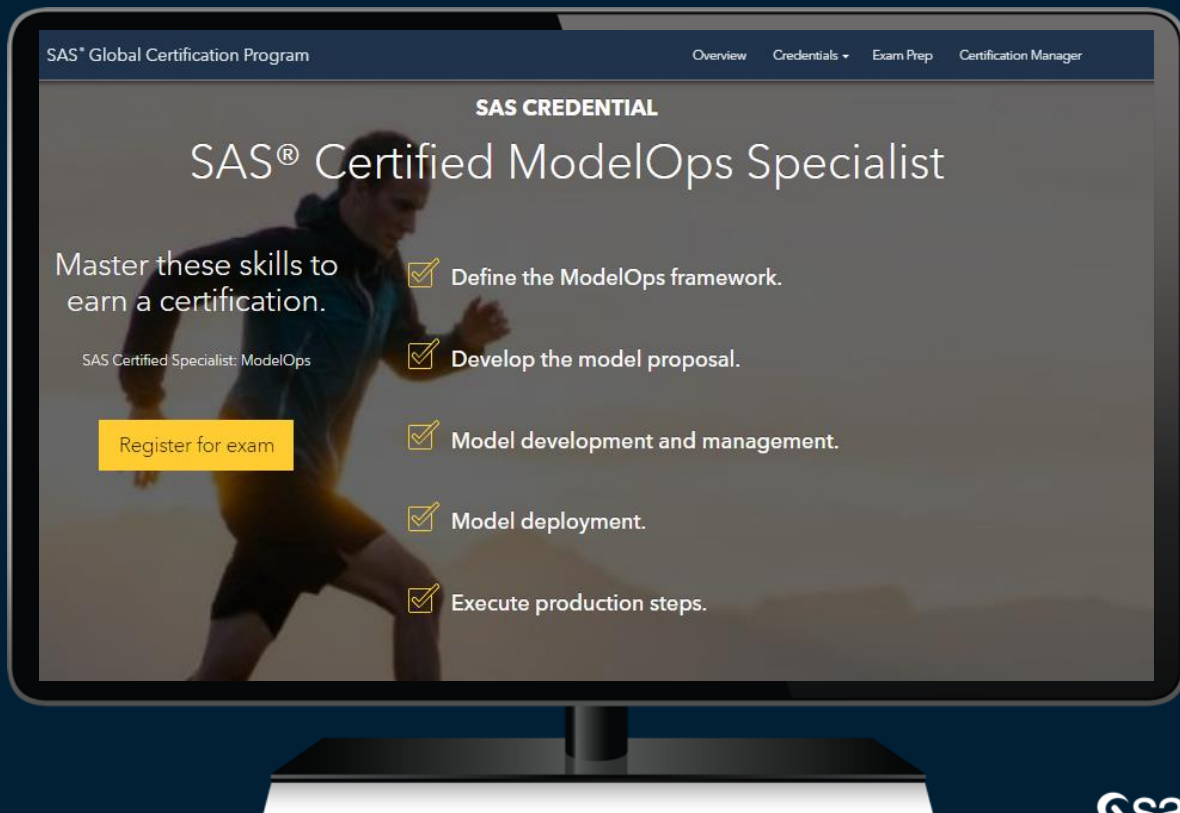
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Learn More

Learn More

- Getting Started with SAS Intelligent Decisioning: Ask the Expert Webinar in February
- SAS Communities: Model Manager
- Managing Models in SAS Viya Course
- ModelOps Course
- ModelOps Certification



The screenshot shows the SAS Global Certification Program website. At the top, there is a navigation bar with links for Overview, Credentials, Exam Prep, and Certification Manager. The main heading is "SAS CREDENTIAL" followed by "SAS® Certified ModelOps Specialist". Below this, a central image of a runner is overlaid with text: "Master these skills to earn a certification." and "SAS Certified Specialist: ModelOps". A yellow button labeled "Register for exam" is positioned over the runner image. To the right of the runner, a list of skills is shown with checkmarks: "Define the ModelOps framework.", "Develop the model proposal.", "Model development and management.", "Model deployment.", and "Execute production steps."



Thank You!

Questions?

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