Amazon SageMaker AI API Reference (https://docs.aws.amazon.com/sagemaker/latest/APIReference/Welcome.ht

AWS CLI commands for Amazon SageMaker AI (https://docs.aws.amazon.com/cli/latest/reference/sagemaker/)

SDKs & Tools (https://aws.amazon.com/tools/)

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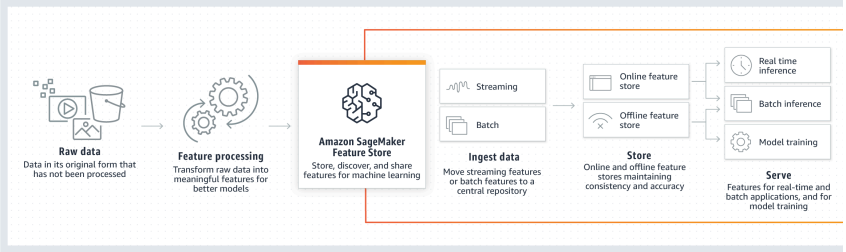
machine learning (ML) development process includes extracting raw data, transforming it into *features* (meaningfu inputs for your ML model). Those features are then stored in serviceable way for data exploration, ML training, and ML inference. Amazon SageMaker Feature Store simplifies how y create, store, share, and manage features. This is done by providing feature store options and reducing repetitive data processing and curation work.

Among other things, with Feature Store you can:

- Simplify feature processing, storing, retrieving, and shar features for ML development across accounts or in an organization.
- Track your feature processing code development, apply y feature processor to the raw data, and ingest your featu into Feature Store in a consistent way. This reduces train serving skew, a common issue in ML where the differenc between performance during training and serving can impact the accuracy of your ML model.
- Store your features and associated metadata in feature groups, so features can be easily discovered and reused. Feature groups are mutable and can evolve their schema after creation.
- Create feature groups that can be configured to include online or offline store, or both, to manage your features automate how features are stored for your ML tasks.

- The online store retains only the latest records for y features. This is primarily designed for supporting re time predictions that need low millisecond latency reads and high throughput writes.
- The offline store keeps all records for your features a historical database. This is primarily intended for da exploration, model training, and batch predictions.

The following diagram shows how you can use Feature Store part of your ML pipeline. Once you read in your raw data, yo can use Feature Store to transform the raw data into feature and ingest them into your feature group. The features can b ingested via streaming or batches to the feature group's onli and offline stores. The features can then be served for data exploration, model training, and real-time or batch inference



How Feature Store works

In Feature Store, features are stored in a collection called a *feature group*. You can visualize a feature group as a table in which each column is a feature, with a unique identifier for e row. In principle, a feature group is composed of features an values specific to each feature. A `Record` is a collection of values for features that correspond to a unique `RecordIdentifier`. Altogether, a `FeatureGroup` is a gr of features defined in your `FeatureStore` to describe a `Record`.

You can use Feature Store in the following modes:

- **Online** – In online mode, features are read with low late (milliseconds) reads and used for high throughput predictions. This mode requires a feature group to be sto in an online store.
- **Offline** – In offline mode, large streams of data are fed t an offline store, which can be used for training and batcl inference. This mode requires a feature group to be store in an offline store. The offline store uses your S3 bucket storage and can also fetch data using Athena queries.
- **Online and Offline** – This includes both online and offlir modes.

You can ingest data into feature groups in Feature Store in t ways: streaming or in batches. When you ingest data throug streaming, a collection of records are pushed to Feature Stor by calling a synchronous `PutRecord` API call. This API enab you to maintain the latest feature values in Feature Store an push new feature values as soon an update is detected.

Alternatively, Feature Store can process and ingest data in batches. For example, you can author features using Amazor SageMaker Data Wrangler and export a notebook from Data Wrangler. The notebook can be a SageMaker Processing job ingests the features in batches to a Feature Store feature gro This mode allows for batch ingestion into the offline store. It also supports ingestion into the online store if the feature gr is configured for both online and offline use.

Create feature groups

To ingest features into Feature Store, you must first define th feature group and the feature definitions (feature name and data type) for all features that belong to the feature group. After they are created, feature groups are mutable and can evolve their schema. Feature group names are unique within AWS Region and AWS account. When creating a feature grou you can also create the metadata for the feature group. The metadata can contain a short description, storage configurat features for identifying each record, and the event time.

Furthermore, the metadata can include tags to store information such as the author, data source, version, and mo

> **Important**
>
> `FeatureGroup` names or associated metadata such as description or tags should not contain any persona identifiable information (PII) or confidential information.

Find, discover, and share features

After you create a feature group in Feature Store, other authorized users of the feature store can share and discover Users can browse through a list of all feature groups in Featu Store or discover existing feature groups by searching by fea group name, description, record identifier name, creation da and tags.

Real-time inference for features stored in the online store

With Feature Store, you can enrich your features stored in th online store in real time with data from a streaming source (clean stream data from another application) and serve the features with low millisecond latency for real-time inference

You can also perform joins across different `FeatureGroups` for real-time inference by querying two different `FeatureGroups` in the client application.

Offline store for model training and batch inference

Feature Store provides offline storage for feature values in y S3 bucket. Your data is stored in your S3 bucket using a

prefixing scheme based on event time. The offline store is an append-only store, enabling Feature Store to maintain a historical record of all feature values. Data is stored in the offline store in Parquet format for optimized storage and qu access.

You can query, explore, and visualize features using Data Wrangler from the console. Feature Store supports combini data to produce, train, validate, and test data sets, and allow you to extract data at different points in time.

Feature data ingestion

Feature generation pipelines can be created to process large batches (1 million rows of data or more) or small batches, an to write feature data to the offline or online store. Streamin sources such as Amazon Managed Streaming for Apache Kaf or Amazon Kinesis can also be used as data sources from wh features are extracted and directly fed to the online store fo training, inference, or feature creation.

You can push records to Feature Store by calling the synchronous `PutRecord` API call. Since this is a synchronou API call, it allows small batches of updates to be pushed in a single API call. This enables you to maintain high freshness c the feature values and publish values as soon as an update is detected. These are also called *streaming features*.

When feature data is ingested and updated, Feature Store st historical data for all features in the offline store. For batch ingest, you can pull feature values from your S3 bucket or us Athena to query. You can also use Data Wrangler to process engineer new features that can then be exported to a chose bucket to be accessed by Feature Store. For batch ingestion, can configure a processing job to batch ingest your data into Feature Store, or you can pull feature values from your S3 bucket using Athena.

To remove a `Record` from your online store, use the `DeleteRecord`