Feast Documentation

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CHAPTER

ONE

FEATURE STORE

class feast.feature_store.**FeatureStore**(*repo_path: Optional[str] = None, config: Optional[feast.repo_config.RepoConfig] = None*)

Bases: object

A FeatureStore object is used to define, create, and retrieve features.

Parameters

- **repo_path** – Path to a *feature_store.yaml* used to configure the feature store
- **config** (*RepoConfig*) – Configuration object used to configure the feature store

apply(*objects: Union[feast.entity.Entity, feast.feature_view.FeatureView, List[Union[feast.feature_view.FeatureView, feast.entity.Entity]]]*)

Register objects to metadata store and update related infrastructure.

The apply method registers one or more definitions (e.g., Entity, FeatureView) and registers or updates these objects in the Feast registry. Once the registry has been updated, the apply method will update related infrastructure (e.g., create tables in an online store) in order to reflect these new definitions. All operations are idempotent, meaning they can safely be rerun.

Parameters **objects** (*List[Union[FeatureView, Entity]]*) – A list of FeatureView or Entity objects that should be registered

Examples

Register a single Entity and FeatureView.

```
>>> from feast.feature_store import FeatureStore
>>> from feast import Entity, FeatureView, Feature, ValueType, FileSource
>>> from datetime import timedelta
>>>
>>> fs = FeatureStore()
>>> customer_entity = Entity(name="customer", value_type=ValueType.INT64,␣
↪description="customer entity")
>>> customer_feature_view = FeatureView(
>>>     name="customer_fv",
>>>     entities=["customer"],
>>>     features=[Feature(name="age", dtype=ValueType.INT64)],
>>>     input=FileSource(path="file.parquet", event_timestamp_column="timestamp
↪"),
>>>     ttl=timedelta(days=1)
>>> )
>>> fs.apply([customer_entity, customer_feature_view])
```

config: **feast.repo_config.RepoConfig**

delete_feature_view(*name: str*)

Deletes a feature view or raises an exception if not found.

Parameters **name** – Name of feature view

get_entity(*name: str*) → feast.entity.Entity

Retrieves an entity.

Parameters **name** – Name of entity

Returns Returns either the specified entity, or raises an exception if none is found

get_feature_view(*name: str*) → feast.feature_view.FeatureView

Retrieves a feature view.

Parameters **name** – Name of feature view

Returns Returns either the specified feature view, or raises an exception if none is found

get_historical_features(*entity_df: Union[pandas.core.frame.DataFrame, str], feature_refs: List[str]*) → feast.infra.offline_stores.offline_store.RetrievalJob

Enrich an entity dataframe with historical feature values for either training or batch scoring.

This method joins historical feature data from one or more feature views to an entity dataframe by using a time travel join.

Each feature view is joined to the entity dataframe using all entities configured for the respective feature view. All configured entities must be available in the entity dataframe. Therefore, the entity dataframe must contain all entities found in all feature views, but the individual feature views can have different entities.

Time travel is based on the configured TTL for each feature view. A shorter TTL will limit the amount of scanning that will be done in order to find feature data for a specific entity key. Setting a short TTL may result in null values being returned.

Parameters

- **entity_df** (*Union[pd.DataFrame, str]*) – An entity dataframe is a collection of rows containing all entity columns (e.g., customer_id, driver_id) on which features need to be joined, as well as a event_timestamp column used to ensure point-in-time correctness. Either a Pandas DataFrame can be provided or a string SQL query. The query must be of a format supported by the configured offline store (e.g., BigQuery)
- **feature_refs** – A list of features that should be retrieved from the offline store. Feature references are of the format "feature_view:feature", e.g., "customer_fv:daily_transactions".

Returns RetrievalJob which can be used to materialize the results.

Examples

Retrieve historical features using a BigQuery SQL entity dataframe

```
>>> from feast.feature_store import FeatureStore
>>>
>>> fs = FeatureStore(config=RepoConfig(provider="gcp"))
>>> retrieval_job = fs.get_historical_features(
>>>     entity_df="SELECT event_timestamp, order_id, customer_id from gcp_
↪project.my_ds.customer_orders",
>>>     feature_refs=["customer:age", "customer:avg_orders_1d", "customer:avg_
↪orders_7d"]
```

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```
>>> )
>>> feature_data = job.to_df()
>>> model.fit(feature_data) # insert your modeling framework here.
```

get_online_features(*feature_refs: List[str], entity_rows: List[Dict[str, Any]]*) → feast.online_response.OnlineResponse

Retrieves the latest online feature data.

Note: This method will download the full feature registry the first time it is run. If you are using a remote registry like GCS or S3 then that may take a few seconds. The registry remains cached up to a TTL duration (which can be set to infinitey). If the cached registry is stale (more time than the TTL has passed), then a new registry will be downloaded synchronously by this method. This download may introduce latency to online feature retrieval. In order to avoid synchronous downloads, please call refresh_registry() prior to the TTL being reached. Remember it is possible to set the cache TTL to infinity (cache forever).

Parameters

- **feature_refs** – List of feature references that will be returned for each entity. Each feature reference should have the following format: "feature_table:feature" where "feature_table" & "feature" refer to the feature and feature table names respectively. Only the feature name is required.
- **entity_rows** – A list of dictionaries where each key-value is an entity-name, entity-value pair.

Returns OnlineResponse containing the feature data in records.

Examples

```
>>> from feast import FeatureStore
>>>
>>> store = FeatureStore(repo_path="...")
>>> feature_refs = ["sales:daily_transactions"]
>>> entity_rows = [{"customer_id": 0},{"customer_id": 1}]
>>>
>>> online_response = store.get_online_features(
>>>     feature_refs, entity_rows)
>>> online_response_dict = online_response.to_dict()
>>> print(online_response_dict)
{'sales:daily_transactions': [1.1,1.2], 'sales:customer_id': [0,1]}
```

list_entities(*allow_cache: bool = False*) → List[feast.entity.Entity]

Retrieve a list of entities from the registry

Parameters **allow_cache** (*bool*) – Whether to allow returning entities from a cached registry

Returns List of entities

list_feature_views() → List[feast.feature_view.FeatureView]

Retrieve a list of feature views from the registry

Returns List of feature views

materialize(*start_date: datetime.datetime, end_date: datetime.datetime, feature_views: Optional[List[str]] = None*) → None

Materialize data from the offline store into the online store.

This method loads feature data in the specified interval from either the specified feature views, or all feature views if none are specified, into the online store where it is available for online serving.

Parameters

- **start_date** (*datetime*) – Start date for time range of data to materialize into the online store
- **end_date** (*datetime*) – End date for time range of data to materialize into the online store
- **feature_views** (*List[str]*) – Optional list of feature view names. If selected, will only run materialization for the specified feature views.

Examples

Materialize all features into the online store over the interval from 3 hours ago to 10 minutes ago.

```
>>> from datetime import datetime, timedelta
>>> from feast.feature_store import FeatureStore
>>>
>>> fs = FeatureStore(config=RepoConfig(provider="gcp"))
>>> fs.materialize(
>>>   start_date=datetime.utcnow() - timedelta(hours=3), end_date=datetime.
↪utcnow() - timedelta(minutes=10)
>>> )
```

materialize_incremental(*end_date: datetime.datetime, feature_views: Optional[List[str]] = None*) → None

Materialize incremental new data from the offline store into the online store.

This method loads incremental new feature data up to the specified end time from either the specified feature views, or all feature views if none are specified, into the online store where it is available for online serving. The start time of the interval materialized is either the most recent end time of a prior materialization or (now - ttl) if no such prior materialization exists.

Parameters

- **end_date** (*datetime*) – End date for time range of data to materialize into the online store
- **feature_views** (*List[str]*) – Optional list of feature view names. If selected, will only run materialization for the specified feature views.

Examples

Materialize all features into the online store up to 5 minutes ago.

```
>>> from datetime import datetime, timedelta
>>> from feast.feature_store import FeatureStore
>>>
>>> fs = FeatureStore(config=RepoConfig(provider="gcp", registry="gs://my-fs/",␣
↪project="my_fs_proj"))
>>> fs.materialize_incremental(end_date=datetime.utcnow() -␣
↪timedelta(minutes=5))
```

property project: str

refresh_registry()

Fetches and caches a copy of the feature registry in memory.

Explicitly calling this method allows for direct control of the state of the registry cache. Every time this method is called the complete registry state will be retrieved from the remote registry store backend (e.g., GCS, S3), and the cache timer will be reset. If refresh_registry() is run before get_online_features() is called, then get_online_feature() will use the cached registry instead of retrieving (and caching) the registry itself.

Additionally, the TTL for the registry cache can be set to infinity (by setting it to 0), which means that refresh_registry() will become the only way to update the cached registry. If the TTL is set to a value greater than 0, then once the cache becomes stale (more time than the TTL has passed), a new cache will be downloaded synchronously, which may increase latencies if the triggering method is get_online_features()

repo_path: `pathlib.Path`

version() → str

Returns the version of the current Feast SDK/CLI

CHAPTER TWO

CONFIG

class feast.repo_config.**DatastoreOnlineStoreConfig**(*, *type: typing_extensions.Literal[datastore] = 'datastore'*, *project_id: pydantic.types.StrictStr = None*)

Online store config for GCP Datastore

project_id: Optional[pydantic.types.StrictStr]
(optional) GCP Project Id

type: typing_extensions.Literal[datastore]
Online store type selector

class feast.repo_config.**FeastBaseModel**
Feast Pydantic Configuration Class

exception feast.repo_config.**FeastConfigError**(*error_message*, *config_path*)

class feast.repo_config.**RegistryConfig**(*, *path: pydantic.types.StrictStr*, *cache_ttl_seconds: pydantic.types.StrictInt = 600*)

Metadata Store Configuration. Configuration that relates to reading from and writing to the Feast registry.

cache_ttl_seconds: pydantic.types.StrictInt
The cache TTL is the amount of time registry state will be cached in memory. If this TTL is exceeded then the registry will be refreshed when any feature store method asks for access to registry state. The TTL can be set to infinity by setting TTL to 0 seconds, which means the cache will only be loaded once and will never expire. Users can manually refresh the cache by calling feature_store.refresh_registry()

Type int

path: pydantic.types.StrictStr
Path to metadata store. Can be a local path, or remote object storage path, e.g. a GCS URI

Type str

class feast.repo_config.**RepoConfig**(*, *registry: Union[pydantic.types.StrictStr, feast.repo_config.RegistryConfig] = 'data/registry.db'*, *project: pydantic.types.StrictStr*, *provider: pydantic.types.StrictStr*, *online_store: Union[feast.repo_config.DatastoreOnlineStoreConfig, feast.repo_config.SqliteOnlineStoreConfig] = SqliteOnlineStoreConfig(type='sqlite', path='data/online.db')*)

Repo config. Typically loaded from *feature_store.yaml*

online_store: Union[feast.repo_config.DatastoreOnlineStoreConfig, feast.repo_config.SqliteOnlineStoreConfig]
Online store configuration (optional depending on provider)

Type OnlineStoreConfig

project: `pydantic.types.StrictStr`
Feast project id. This can be any alphanumeric string up to 16 characters. You can have multiple independent feature repositories deployed to the same cloud provider account, as long as they have different project ids.

Type str

provider: `pydantic.types.StrictStr`
local or gcp

Type str

registry: `Union[pydantic.types.StrictStr, feast.repo_config.RegistryConfig]`
Path to metadata store. Can be a local path, or remote object storage path, e.g. a GCS URI

Type str

class `feast.repo_config.`**`SqliteOnlineStoreConfig`**(*, *type: typing_extensions.Literal[sqlite] = 'sqlite'*, *path: pydantic.types.StrictStr = 'data/online.db'*)

Online store config for local (SQLite-based) store

path: `pydantic.types.StrictStr`
(optional) Path to sqlite db

type: `typing_extensions.Literal[sqlite]`
Online store type selector

CHAPTER

THREE

DATA SOURCE

class feast.data_source.**BigQueryOptions**(*table_ref: Optional[str], query: Optional[str]*)

DataSource BigQuery options used to source features from BigQuery query

classmethod from_proto(*bigquery_options_proto: feast.core.DataSource_pb2.BigQueryOptions*)

Creates a BigQueryOptions from a protobuf representation of a BigQuery option

Parameters **bigquery_options_proto** – A protobuf representation of a DataSource

Returns Returns a BigQueryOptions object based on the bigquery_options protobuf

property query

Returns the BigQuery SQL query referenced by this source

property table_ref

Returns the table ref of this BQ table

to_proto() → feast.core.DataSource_pb2.BigQueryOptions

Converts an BigQueryOptionsProto object to its protobuf representation.

Returns BigQueryOptionsProto protobuf

class feast.data_source.**BigQuerySource**(*event_timestamp_column: Optional[str] = None, table_ref: Optional[str] = None, created_timestamp_column: Optional[str] = '', field_mapping: Optional[Dict[str, str]] = None, date_partition_column: Optional[str] = '', query: Optional[str] = None*)

property bigquery_options

Returns the bigquery options of this data source

get_table_query_string() → str

Returns a string that can directly be used to reference this table in SQL

to_proto() → feast.core.DataSource_pb2.DataSource

Converts an DataSourceProto object to its protobuf representation.

class feast.data_source.**DataSource**(*event_timestamp_column: str, created_timestamp_column: Optional[str] = '', field_mapping: Optional[Dict[str, str]] = None, date_partition_column: Optional[str] = ''*)

DataSource that can be used source features

property created_timestamp_column

Returns the created timestamp column of this data source

property date_partition_column

Returns the date partition column of this data source

property event_timestamp_column
Returns the event timestamp column of this data source

property field_mapping
Returns the field mapping of this data source

static from_proto(*data_source*)
Convert data source config in FeatureTable spec to a DataSource class object.

to_proto() → feast.core.DataSource_pb2.DataSource
Converts an DataSourceProto object to its protobuf representation.

class feast.data_source.**FileOptions**(*file_format: Optional[feast.data_format.FileFormat], file_url: Optional[str]*)
DataSource File options used to source features from a file

property file_format
Returns the file format of this file

property file_url
Returns the file url of this file

classmethod from_proto(*file_options_proto: feast.core.DataSource_pb2.FileOptions*)
Creates a FileOptions from a protobuf representation of a file option

Parameters **file_options_proto** – a protobuf representation of a datasource

Returns Returns a FileOptions object based on the file_options protobuf

to_proto() → feast.core.DataSource_pb2.FileOptions
Converts an FileOptionsProto object to its protobuf representation.

Returns FileOptionsProto protobuf

class feast.data_source.**FileSource**(*event_timestamp_column: Optional[str] = None, file_url: Optional[str] = None, path: Optional[str] = None, file_format: Optional[feast.data_format.FileFormat] = None, created_timestamp_column: Optional[str] = '', field_mapping: Optional[Dict[str, str]] = None, date_partition_column: Optional[str] = ''*)

property file_options
Returns the file options of this data source

property path
Returns the file path of this feature data source

to_proto() → feast.core.DataSource_pb2.DataSource
Converts an DataSourceProto object to its protobuf representation.

class feast.data_source.**KafkaOptions**(*bootstrap_servers: str, message_format: feast.data_format.StreamFormat, topic: str*)
DataSource Kafka options used to source features from Kafka messages

property bootstrap_servers
Returns a comma-separated list of Kafka bootstrap servers

classmethod from_proto(*kafka_options_proto: feast.core.DataSource_pb2.KafkaOptions*)
Creates a KafkaOptions from a protobuf representation of a kafka option

Parameters **kafka_options_proto** – A protobuf representation of a DataSource

Returns Returns a BigQueryOptions object based on the kafka_options protobuf

property message_format
Returns the data format that is used to encode the feature data in Kafka messages

to_proto() → feast.core.DataSource_pb2.KafkaOptions
Converts an KafkaOptionsProto object to its protobuf representation.

Returns KafkaOptionsProto protobuf

property topic
Returns the Kafka topic to collect feature data from

class feast.data_source.**KafkaSource**(*event_timestamp_column: str, bootstrap_servers: str, message_format: feast.data_format.StreamFormat, topic: str, created_timestamp_column: Optional[str] = '', field_mapping: Optional[Dict[str, str]] = {}, date_partition_column: Optional[str] = ''*)

property kafka_options
Returns the kafka options of this data source

to_proto() → feast.core.DataSource_pb2.DataSource
Converts an DataSourceProto object to its protobuf representation.

class feast.data_source.**KinesisOptions**(*record_format: feast.data_format.StreamFormat, region: str, stream_name: str*)
DataSource Kinesis options used to source features from Kinesis records

classmethod from_proto(*kinesis_options_proto: feast.core.DataSource_pb2.KinesisOptions*)
Creates a KinesisOptions from a protobuf representation of a kinesis option

Parameters **kinesis_options_proto** – A protobuf representation of a DataSource

Returns Returns a KinesisOptions object based on the kinesis_options protobuf

property record_format
Returns the data format used to encode the feature data in the Kinesis records.

property region
Returns the AWS region of Kinesis stream

property stream_name
Returns the Kinesis stream name to obtain feature data from

to_proto() → feast.core.DataSource_pb2.KinesisOptions
Converts an KinesisOptionsProto object to its protobuf representation.

Returns KinesisOptionsProto protobuf

class feast.data_source.**KinesisSource**(*event_timestamp_column: str, created_timestamp_column: str, record_format: feast.data_format.StreamFormat, region: str, stream_name: str, field_mapping: Optional[Dict[str, str]] = {}, date_partition_column: Optional[str] = ''*)

property kinesis_options
Returns the kinesis options of this data source

to_proto() → feast.core.DataSource_pb2.DataSource
Converts an DataSourceProto object to its protobuf representation.

class feast.data_source.**SourceType**(*value*)
DataSource value type. Used to define source types in DataSource.

CHAPTER

FOUR

ENTITY

class feast.entity.**Entity**(*name: str, value_type: feast.value_type.ValueType, description: str = '', join_key: Optional[str] = None, labels: Optional[MutableMapping[str, str]] = None*)

Represents a collection of entities and associated metadata.

property created_timestamp

Returns the created_timestamp of this entity

property description

Returns the description of this entity

classmethod from_dict(*entity_dict*)

Creates an entity from a dict

Parameters **entity_dict** – A dict representation of an entity

Returns Returns a EntityV2 object based on the entity dict

classmethod from_proto(*entity_proto: feast.core.Entity_pb2.Entity*)

Creates an entity from a protobuf representation of an entity

Parameters **entity_proto** – A protobuf representation of an entity

Returns Returns a EntityV2 object based on the entity protobuf

classmethod from_yaml(*yml: str*)

Creates an entity from a YAML string body or a file path

Parameters **yml** – Either a file path containing a yaml file or a YAML string

Returns Returns a EntityV2 object based on the YAML file

is_valid()

Validates the state of a entity locally. Raises an exception if entity is invalid.

property join_key

Returns the join key of this entity

property labels

Returns the labels of this entity. This is the user defined metadata defined as a dictionary.

property last_updated_timestamp

Returns the last_updated_timestamp of this entity

property name

Returns the name of this entity

to_dict() → Dict

Converts entity to dict

Returns Dictionary object representation of entity

`to_proto()` → feast.core.Entity_pb2.Entity
Converts an entity object to its protobuf representation

Returns EntityV2Proto protobuf

`to_spec_proto()` → feast.core.Entity_pb2.EntitySpecV2
Converts an EntityV2 object to its protobuf representation. Used when passing EntitySpecV2 object to Feast request.

Returns EntitySpecV2 protobuf

`to_yaml()`
Converts a entity to a YAML string.

Returns Entity string returned in YAML format

`property value_type: feast.value_type.ValueType`
Returns the type of this entity

CHAPTER

FIVE

FEATURE VIEW

class feast.feature_view.**FeatureView**(*name: str, entities: List[str], ttl: Optional[Union[google.protobuf.duration_pb2.Duration, datetime.timedelta]], input: Union[feast.data_source.BigQuerySource, feast.data_source.FileSource], features: List[feast.feature.Feature] = [], tags: Optional[Dict[str, str]] = None, online: bool = True*)

A FeatureView defines a logical grouping of serveable features.

classmethod from_proto(*feature_view_proto: feast.core.FeatureView_pb2.FeatureView*)

Creates a feature view from a protobuf representation of a feature view

Parameters **feature_view_proto** – A protobuf representation of a feature view

Returns Returns a FeatureViewProto object based on the feature view protobuf

is_valid()

Validates the state of a feature view locally. Raises an exception if feature view is invalid.

to_proto() → feast.core.FeatureView_pb2.FeatureView

Converts an feature view object to its protobuf representation.

Returns FeatureViewProto protobuf

CHAPTER

SIX

FEATURE TABLE

class feast.feature_table.**FeatureTable**(*name: str, entities: List[str], features: List[feast.feature.Feature], batch_source: Optional[Union[feast.data_source.BigQuerySource, feast.data_source.FileSource]] = None, stream_source: Optional[Union[feast.data_source.KafkaSource, feast.data_source.KinesisSource]] = None, max_age: Optional[google.protobuf.duration_pb2.Duration] = None, labels: Optional[MutableMapping[str, str]] = None*)

Represents a collection of features and associated metadata.

add_feature(*feature: feast.feature.Feature*)

Adds a new feature to the feature table.

property batch_source

Returns the batch source of this feature table

property created_timestamp

Returns the created_timestamp of this feature table

property entities

Returns the entities of this feature table

property features

Returns the features of this feature table

classmethod from_dict(*ft_dict*)

Creates a feature table from a dict

Parameters **ft_dict** – A dict representation of a feature table

Returns Returns a FeatureTable object based on the feature table dict

classmethod from_proto(*feature_table_proto: feast.core.FeatureTable_pb2.FeatureTable*)

Creates a feature table from a protobuf representation of a feature table

Parameters **feature_table_proto** – A protobuf representation of a feature table

Returns Returns a FeatureTableProto object based on the feature table protobuf

classmethod from_yaml(*yml: str*)

Creates a feature table from a YAML string body or a file path

Parameters **yml** – Either a file path containing a yaml file or a YAML string

Returns Returns a FeatureTable object based on the YAML file

is_valid()

Validates the state of a feature table locally. Raises an exception if feature table is invalid.

property labels
Returns the labels of this feature table. This is the user defined metadata defined as a dictionary.

property last_updated_timestamp
Returns the last_updated_timestamp of this feature table

property max_age
Returns the maximum age of this feature table. This is the total maximum amount of staleness that will be allowed during feature retrieval for each specific feature that is looked up.

property name
Returns the name of this feature table

property stream_source
Returns the stream source of this feature table

to_dict() → Dict
Converts feature table to dict

Returns Dictionary object representation of feature table

to_proto() → feast.core.FeatureTable_pb2.FeatureTable
Converts an feature table object to its protobuf representation

Returns FeatureTableProto protobuf

to_spec_proto() → feast.core.FeatureTable_pb2.FeatureTableSpec
Converts an FeatureTableProto object to its protobuf representation. Used when passing FeatureTableSpecProto object to Feast request.

Returns FeatureTableSpecProto protobuf

to_yaml()
Converts a feature table to a YAML string.

Returns Feature table string returned in YAML format

CHAPTER

SEVEN

FEATURE

class feast.feature.**Feature**(*name: str*, *dtype: feast.value_type.ValueType*, *labels: Optional[MutableMapping[str, str]] = None*)

Feature field type

property dtype: feast.value_type.ValueType

Getter for data type of this field

classmethod from_proto(*feature_proto: feast.core.Feature_pb2.FeatureSpecV2*)

Parameters **feature_proto** – FeatureSpecV2 protobuf object

Returns Feature object

property labels: MutableMapping[str, str]

Getter for labels of this field

property name

Getter for name of this field

to_proto() → feast.core.Feature_pb2.FeatureSpecV2

Converts Feature object to its Protocol Buffer representation

class feast.feature.**FeatureRef**(*name: str*, *feature_table: str*)

Feature Reference represents a reference to a specific feature.

classmethod from_proto(*proto: feast.serving.ServingService_pb2.FeatureReferenceV2*)

Construct a feature reference from the given FeatureReference proto

Parameters **proto** – Protobuf FeatureReference to construct from

Returns FeatureRef that refers to the given feature

classmethod from_str(*feature_ref_str: str*)

Parse the given string feature reference into FeatureRef model String feature reference should be in the format feature_table:feature. Where "feature_table" and "name" are the feature_table name and feature name respectively.

Parameters **feature_ref_str** – String representation of the feature reference

Returns FeatureRef that refers to the given feature

to_proto() → feast.serving.ServingService_pb2.FeatureReferenceV2

Convert and return this feature table reference to protobuf.

Returns Protobuf respresentation of this feature table reference.

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