PyQGIS plugin de geoprocessamento

Disciplina: Programação aplicada à engenharia cartográfica

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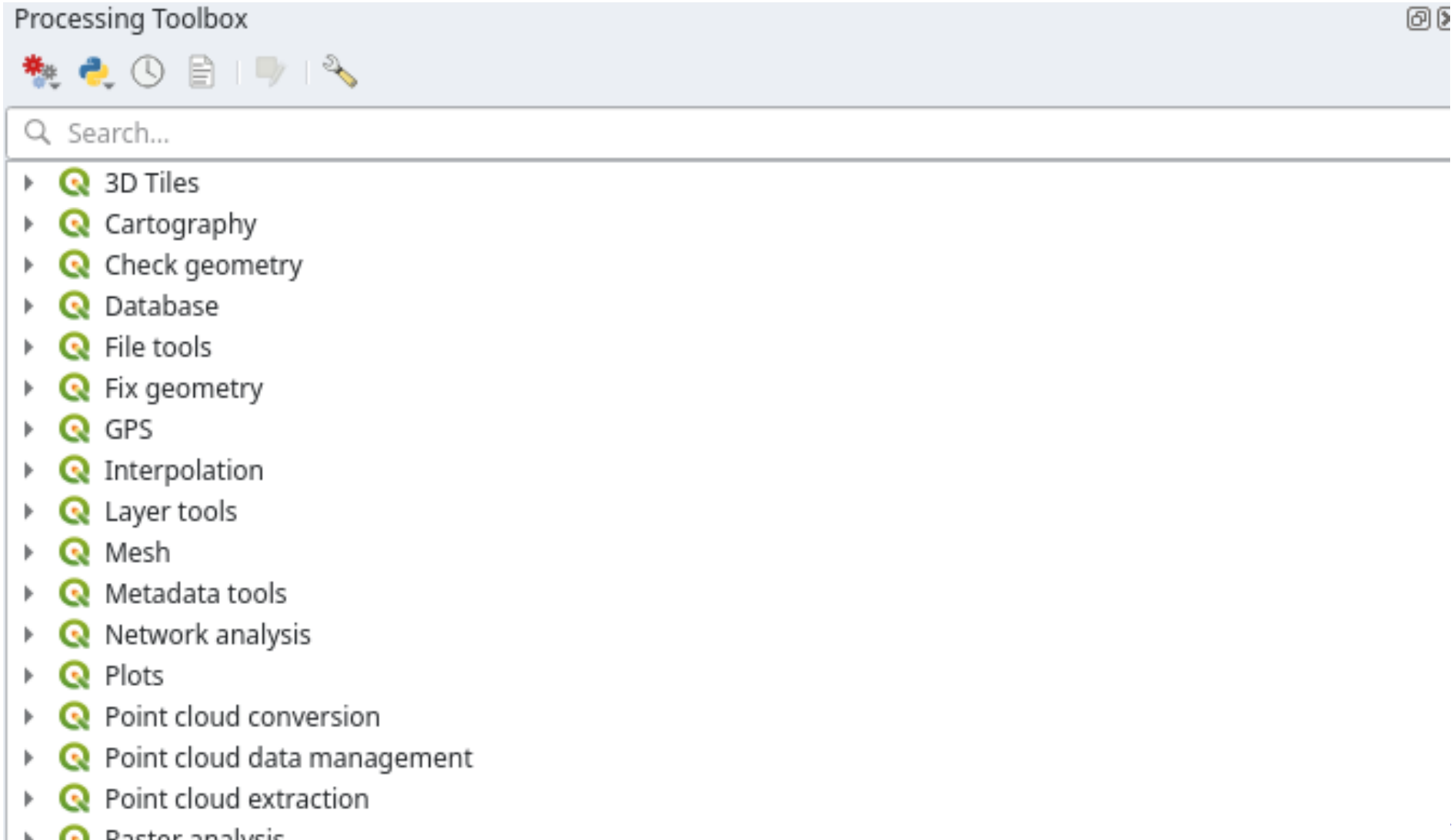
11 de fevereiro de 2026

Objetivos

- Ilustrar operações de geoprocessamento
- Trabalhar com dados Matriciais (Raster) e Vetoriais (Vector)



Executando Algoritmos pelo Console

O QGIS permite executar algoritmos diretamente via console Python.

Documentação oficial:
`https://docs.qgis.org/3.40/en/docs/user_manual/processing/console.html`

Exemplo:

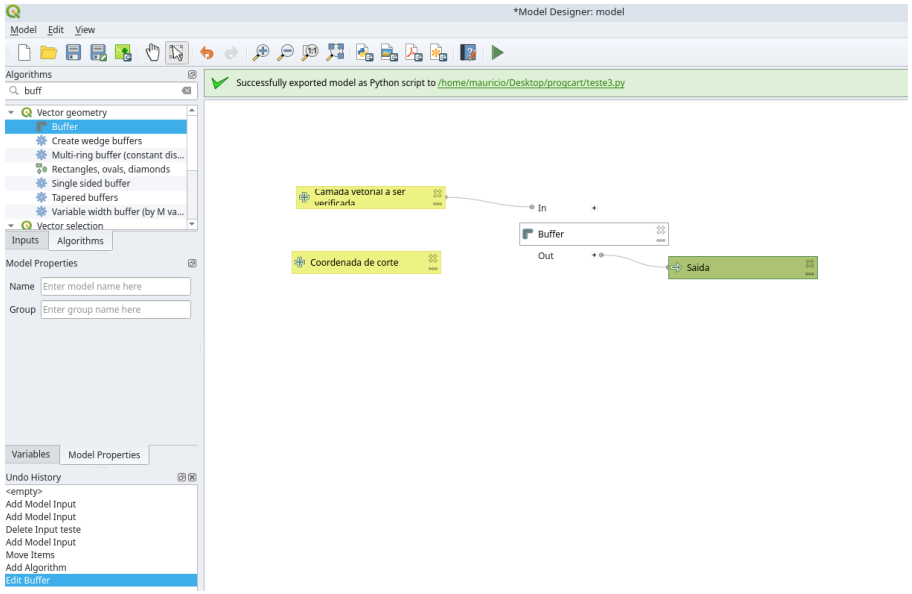
- `processing.run("native:buffer", {...})`

```
from qgis.core import *

# Supply path to qgis install location
QgsApplication.setPrefixPath("/path/to/qgis/installation", True)
#QgsApplication.setPrefixPath("/home/mauricio/miniforge3/envs/qgis/bin/", True)


# Create a reference to the QgsApplication.  Setting the
# second argument to False disables the GUI.
qgs = QgsApplication([], False)



# Load providers
qgs.initQgis()

from teste3 import Model

# Write your code here to load some layers, use processing
# algorithms, etc.
```

Construindo um Script com Model Builder

Estratégia recomendada:

1. Abrir o **Model Builder**
2. Criar um modelo com as entradas do plugin
3. Inserir processos que serão utilizados
4. Testar o fluxo
5. Exportar para Python:
   - Model → Export → Export as Python Script

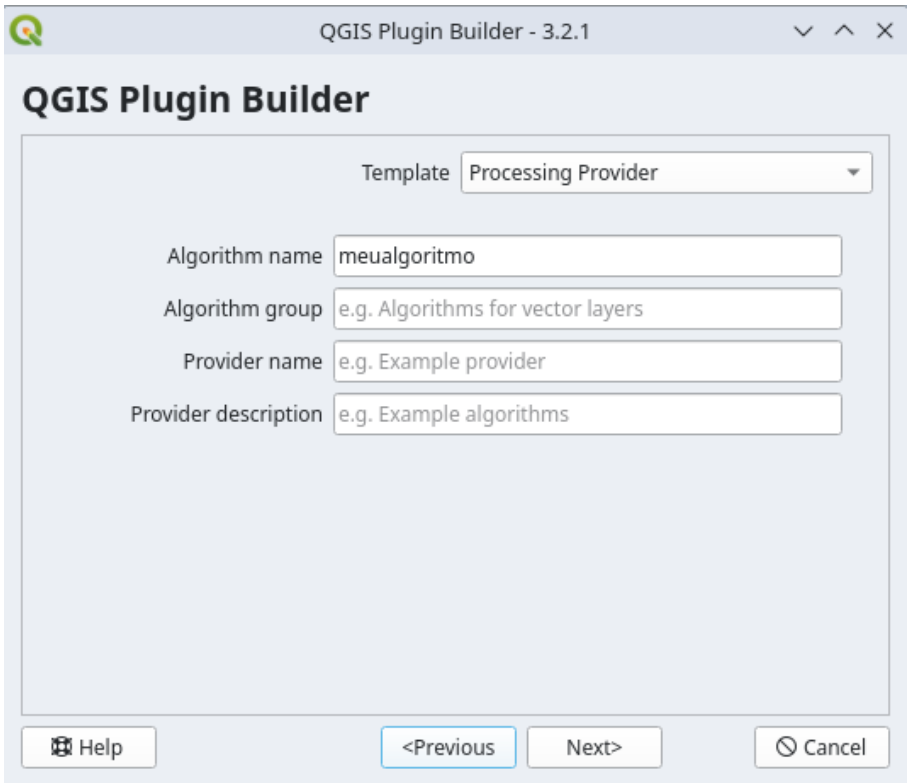


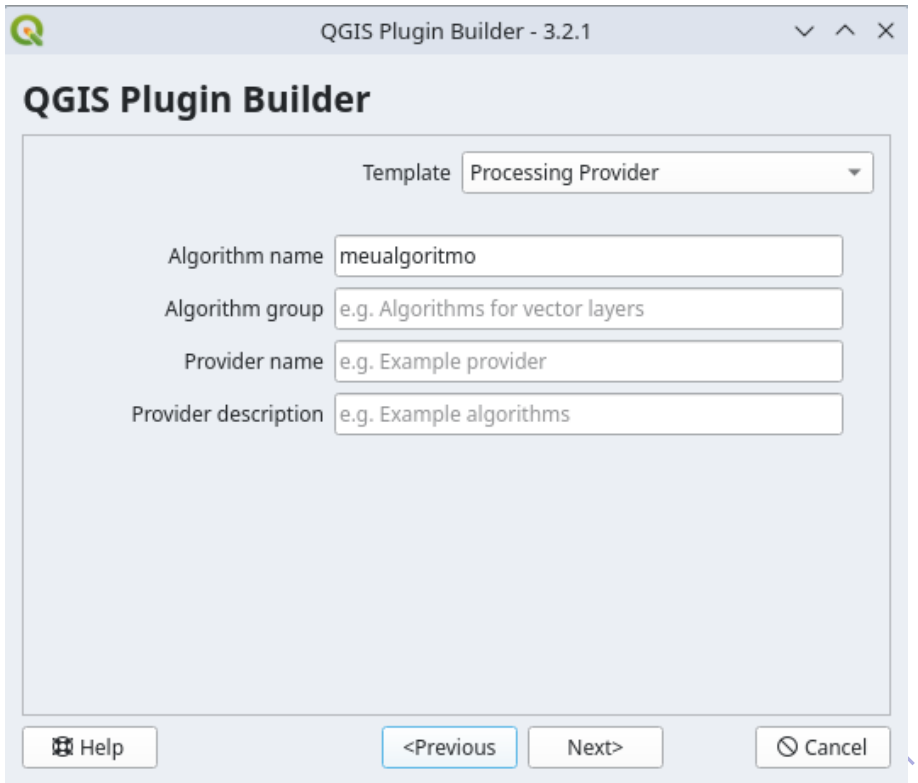
Plugin Builder

Criar um plugin do tipo **Processing Provider**

Passos:

- Gerar estrutura do plugin pelo Plugin Builder
- Copiar para pasta de plugins do QGIS
- Ativar no Instalador de Plugins





Adicionar o Script ao Plugin

- Copiar o arquivo exportado pelo Model Builder
- Inserir na pasta do plugin
- Adicionar o import no provider

```
from qgis.core import QgsProcessingProvider
from .proc_algorithm import procAlgorithm
from .teste3 import Model

class procProvider(QgsProcessingProvider):

    def __init__(self):
        """
        Default constructor.
        """
        QgsProcessingProvider.__init__(self)

    def unload(self):
        """
        Unloads the provider. Any tear-down steps required by the provider
        should be implemented here.
        """
        pass

    def loadAlgorithms(self):
        """
        Loads all algorithms belonging to this provider.
        """
        self.addAlgorithm(procAlgorithm())
        self.addAlgorithm(Model())
        # add additional algorithms here
        # self.addAlgorithm(MyOtherAlgorithm())
```

Processing Scripts no QGIS

Referência essencial:
https://docs.qgis.org/3.40/en/docs/user_manual/processing/scripts.html

```
def processAlgorithm(self, parameters, context, feedback):
    """
    Here is where the processing itself takes place.
    """
    # First, we get the count of features from the INPUT layer.
    # This layer is defined as a QgsProcessingParameterFeatureSource
    # parameter, so it is retrieved by calling
    # self.parameterAsSource.
    input_featuresource = self.parameterAsSource(parameters,
                                                 'INPUT',
                                                 context)
    numfeatures = input_featuresource.featureCount()

    # Retrieve the buffer distance and raster cell size numeric
    # values. Since these are numeric values, they are retrieved
    # using self.parameterAsDouble.
    bufferdist = self.parameterAsDouble(parameters, 'BUFFERDIST',
                                        context)
    rastercellsize = self.parameterAsDouble(parameters, 'CELLSIZE',
                                            context)
    if feedback.isCanceled():
        return {}
```

Leitura interessante:
https://qgis-tuts-wu.readthedocs.io/en/latest/land_degradation_development/scripts/rasterizing.html

Entradas e Saídas no Processing

Principais tipos de parâmetros:

Entradas

QgsProcessingParameterRasterLayer

QgsProcessingParameterVectorLayer

QgsProcessingParameterNumber

QgsProcessingParameterNumber.Type.Double

Saídas

QgsProcessingOutputNumber

QgsProcessingOutputVectorLayer

QgsProcessingOutputRasterLayer

Link com parâmetros disponíveis no Processing.

Acessando as Feições do VectorLayer

Dentro do método `processAlgorithm()`:

- Recuperar camada:
  - `self.parameterAsVectorLayer(...)`
- Iterar feições:
  - `for feat in layer.getFeatures():`
- Acessar geometria:
  - `feat.geometry()`

Acessando as Feições do VectorLayer

```
class Model(QgsProcessingAlgorithm):

    def initAlgorithm(self, config: Optional[dict[str, Any]] = None):
        self.addParameter(QgsProcessingParameterVectorLayer('camada_vetorial_a_ser_verificada', 'Camada vetorial a ser verificada', defaultValue=None))
        self.addParameter(QgsProcessingParameterNumber('coordenada_de_corte', 'Coordenada de corte', type=QgsProcessingParameterNumber.Double, defaultValue=None))
        self.addParameter(QgsProcessingParameterFeatureSink('Saida', 'Saida', type=QgsProcessing.TypeVectorPolygon, createByDefault=True, supportsAppend=True, defaul

    def processAlgorithm(self, parameters: dict[str, Any], context: QgsProcessingContext, model_feedback: QgsProcessingFeedback) -> dict[str, Any]:
        # Use a multi-step feedback, so that individual child algorithm progress reports are adjusted for the
        # overall progress through the model
        feedback = QgsProcessingMultiStepFeedback(1, model_feedback)
        results = {}
        outputs = {}

        input_featuresource = self.parameterAsSource(parameters, 'camada_vetorial_a_ser_verificada', context)

        numfeatures = input_featuresource.featureCount()
        print(numfeatures)
        for feat in input_featuresource.getFeatures():
            print(feat)

        bufferdist = self.parameterAsDouble(parameters, 'coordenada_de_corte',  context)


        if feedback.isCanceled():

            return {}
```

```
input_featuresource = self.parameterAsSource(parameters, 'camada_ve
for feat in input_featuresource.getFeatures():
  print(feat)
```

Exemplo de Algoritmo Processing (Buffer)

```
from qgis.core import (
QgsProcessing,
QgsProcessingAlgorithm,
QgsProcessingParameterVectorLayer,
QgsProcessingParameterNumber,
QgsProcessingParameterFeatureSink,
QgsFeature
)

class SimpleBuffer(QgsProcessingAlgorithm):

INPUT = 'INPUT'
DIST = 'DIST'
OUTPUT = 'OUTPUT'

def initAlgorithm(self, config=None):
self.addParameter(
QgsProcessingParameterVectorLayer(
self.INPUT,
'Camada de entrada'
)
)

self.addParameter(
```