**Code Description**

**Python libraries required to run this project:**

**Osgeo, csv, matplotlib, math, os, numpy, json, time, multiprocessing, seaborn, pandas, rasterio, geopandas, whitebox**

**Organize each watershed in the given form before running, see the code for details.** **Unzip the contents of DATA.zip to the code directory in advance.**

**1. Run the main function**

**The main processing function is stored in Judge\_by\_Surface\_Morphology.py**

**1.1 Produce a river network, run single\_acc\_threshold.sbatch\_extract\_stream, and modify the threshold at line 32 of single\_acc\_threshold.py according to user needs**

**1.2 Enter the main processing stream and run Judge\_by\_Surface\_Morphology.sbatch\_get\_basin\_embedding\_combination**

**1.3 Verify the CSI based on the number of river sections, run valid.sbatch\_erroer\_matrix**

**1.4 Verify the CSI based on the length of the river section, run valid.sbatch\_erroer\_matrix1**

**2. Drawing function**

**The drawing function is stored in Draw.py**

**2.1 Figure1: Drawing with Visio and PPT, no code**

**2.2 Figure2: Drawing with PPT, no code**

**2.3 Figure3: Drawing with ArcGIS software, no code**

**2.4 Figure 4: Draw with ArcGIS software, no code. The data is the result of step 1**

**2.5 Figure 5: Run Draw.heapmap\_cosis\_brown\_mountain\_watershed, Draw.heapmap\_cosis\_little\_yellow\_creek\_watershed, Draw.heapmap\_cosis\_buffalo\_draw\_watershed, the data is the result of 1.3 and 1.4.**

**代码说明**

**运行该项目所需的Python库：**

Osgeo、csv、matplotlib、math、os、numpy、json、time、multiprocessing、seaborn、pandas、rasterio、geopandas、whitebox

运行前将每个流域按照给定的形式进行组织，详情参见代码。提前将DATA.zip的内容解压到代码目录。

1. 运行主函数

主要处理函数存放在Judge\_by\_Surface\_Morphology.py

* 1. 生产河网，运行single\_acc\_threshold.sbatch\_extract\_stream，根据用户需求single\_acc\_threshold.py的32行处修改阈值
  2. 进入主要处理流，运行Judge\_by\_Surface\_Morphology.sbatch\_get\_basin\_embedding\_combination
  3. 验证基于河段数量的CSI，运行valid.sbatch\_erroer\_matrix
  4. 验证基于河段长度的CSI，运行valid.sbatch\_erroer\_matrix1

1. 绘图函数

绘图函数存放在Draw.py

2.1 Figure1：使用Visio和PPT进行绘制，无代码

2.2 Figure2：使用PPT进行绘制，无代码

2.3 Figure3：使用Arcgis软件绘制，无代码

2.4 Figure4：使用Arcgis软件绘制，无代码。数据为步骤1的结果

2.5 Figure5：运行Draw.heapmap\_cosis\_brown\_mountain\_watershed, Draw.heapmap\_cosis\_little\_yellow\_creek\_watershed, Draw.heapmap\_cosis\_buffalo\_draw\_watershed，数据为1.3和1.4的结果。