

Exam 'GPT for Programming in Matlab and Python'
Winter term 2025/26

General information

Hand-Out: Tuesday, February 10 2025 13:00 via Ilias

Hand-In: Tuesday, February 24 2025 23:59 via Ilias. Only files uploaded before 23:59 will be graded.

The approach is part of the solution, and will be scored.

Auxiliary means

The exam is open-book, therefore lecture notes, Matlab on- and offline help, Python on- and offline help, Mistral / LLMs can be used.

No help from other persons is permitted.

Work instructions

1. Download the files from Ilias to your computer
2. Work on the tasks described on the next pages, and produce the requested results. Use the variable names given in the task description.
3. Upload all required files to Ilias. The uploaded files will automatically be assigned to your account, and thus can be related to each student.

Good Luck!

Task: Finding the top of Baden-Württemberg

A colleague of yours is going to leave KIT. She once wrote a program in Visual Basic for Applications (VBA) to search for the highest point in a Digital Elevation Model (DEM) of Baden-Württemberg with the iterative search algorithm Simulated Annealing (SimAnn).

- The DEM data are contained in the file **dgm100m.grd**. It is a regular 1750-by-1750 grid, each grid represents an area of 100-by-100 meters. Values are in meters above sea level [masl].
- The VBA code is contained in the file **SimAnnealing.bas**.

Your task is to use Mistral to translate the VBA legacy code into Python **or** Matlab, and to test-apply it. In particular:

- Use Mistral to translate the VBA code into Matlab or Python code. Save your related Mistral prompt(s) in a file called **prompts_1**. Save the code in a file called **code_1**.
- Test-apply code_1 several times. You will notice that the output (maximum height **MaxValue** and its grid coordinates **xmax** and **ymax**) of the repeated tests will differ. This is due to the probabilistic nature of the SimAnn algorithm.
- Use Mistral to write Matlab or Python code that calls **code_1** 100 times and stores the related results in a [100,3] array called **allResults**. **allResults(:,1)** is for MaxValue, **allResults(:,2)** for xmax, **allResults(:,3)** for ymax. Then, from the same program, plot a histogram of the distribution of all MaxValue values, and save the largest of all MaxValue values in a variable called **TopOfBW_SimAnn**. Save your related Mistral prompt(s) in a file called **prompts_2**. Save the code in a file called **code_2**.
- Use Mistral to write Matlab or Python code that finds the largest elevation by brute force, i.e. simply find the largest elevation value in dgm100.grd. Save that value in a variable called **TopOfBW_BruteForce**. Save your related Mistral prompt(s) in a file called **prompts_3**. Save the code in a file called **code_3**.

When you are done, upload the following items to Ilias:

- **prompts_1, prompts_2, prompts_3**
- **code_1, code_2, code_3**