The python code convert_unit.py includes a routine to convert a user selected value and unit system to other unit systems. The code is explained in detail in the sections below.

1 Description of function

A function called converter(value, unit) is defined and called in the code.

1.1 Inputs

Two inputs are taken into the function converter(value, unit). The two inputs are value and unit. The routine asks for user inputs interactively. The value could be a float number and the unit should be chosen from “meter, mile, inch, foot, yard”.

1.2 Outputs

The outputs are two lists with converted values and units in. The first list displays all the unit systems of “meter, mile, inch, foot, yard” except for the unit system of input. The second list displays the requested value in SI multiples of meter, including nanometer (nm), micrometer (um), millimeter (mm), centimeter (cm), kilometer (km).

1.3 Usage of dictionaries

Four dictionaries are defined in the routine: meter_convert {}, SI_converter{}, Dict{} and Dict_SI{}.

- Meter_convert{}: It takes units of “meter, mile, inch, foot, yard” as keys and the conversion number compared to meter as values.
- SI_converter{}: It takes units of “nm, um, mm, cm, km” as keys and the conversion number compared to meter as values.
- Dict{}: It’s created to store the converted value and units from the input to “meter, mile, inch, foot, yard” systems except for the input unit. It takes unit as keys and converted length as values.
- Dict_SI{}: It’s created to store the converted value and units from the input to “nm, um, mm, cm, km” systems. It takes unit as keys and converted length as values.

1.4 Usage of lists

Two lists are created to store the converted values and units as results: result_1 and result_2. Each item within the lists shows a value and its corresponding unit. The lists are outputs.

1.5 Conversion process

The code first reads in the user defined value and unit, and convert it to meter using meter_convert{}. Then the meter value is converted to the other units using meter_convert{} and SI_converter{}.
2 Examples

To run the code, simply type in “python convert_unit.py”. It will prompt a line “Please input a number :” where the user choose an arbitrary number. Then it will prompt a line of “Please input a unit (meter, mile, inch, foot, yard) :” where the user choose one of five units. The routine will perform the conversion and produce the output as two lists. Three examples are shown below.

2.1 Example 1

```bash
eduroam-169-233-232-189:~$ duanzhang$ python convert_unit.py
Please input a number : 5
Please input a unit (meter, mile, inch, foot, yard) : foot
['59.999998476 inch', '0.00094640396715 mile', '1.66666615867 yard', '1.52399995123 meter']
['1523999.95123 um', '1523.9995123 mm', '152.39995123 cm', '1523999.95123 nm', '0.00152399995123 km']
```

Figure 1: Conversion of 5 foot

2.2 Example 2

```bash
eduroam-169-233-232-189:~$ duanzhang$ python convert_unit.py
Please input a number : 7
Please input a unit (meter, mile, inch, foot, yard) : yard
['252.000070409 inch', '21.0000634008 foot', '0.00397489788435 mile', '6.40080174614 meter']
['6400801.74614 um', '6400.00174614 mm', '640.000174614 cm', '6400801.74614 nm', '0.00640080174614 km']
```

Figure 2: Conversion of 7 yard

2.3 Example 3

```bash
eduroam-169-233-232-189:~$ duanzhang$ python convert_unit.py
Please input a number : 250
Please input a unit (meter, mile, inch, foot, yard) : mile
['15849468.1905 inch', '1320789.04992 foot', '440262.882448 yard', '402576.489533 meter']
['4.02576489533e+11 um', '402576489.533 nm', '4025764895.33 cm', '4.02576489533e+14 nm', '402.576489533 km']
```

Figure 3: Conversion of 250 mile