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| Prime Number Generator and checker | |
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|  | INTRODUCTION The project "Prime Number Generator and Checker" is a Python-based program designed to perform two main tasks:   * **Prime Number Checker:** Determine if a given number is a prime number or not. * **Prime Number Generator:** Generate all prime numbers up to a specified limit.   Prime numbers are numbers greater than 1 that cannot be divided evenly by any number other than 1 and themselves. This program is useful for mathematical applications, cryptography, and algorithm development. | |  |
|  | OBJECTIVE The key objectives of the project are:   1. To design a function that checks whether a given number is prime. 2. To create a generator that produces prime numbers up to a specified limit. 3. To allow user interaction by taking input for the number to check and the limit for generating primes. 4. To provide appropriate error handling to ensure the input is valid | |  |
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**Features**

The program has the following features:

* **Prime Number Checker:**
  + Takes a user-input number and checks if it is prime or not.
  + Returns a message indicating whether the number is prime or not.
* **Prime Number Generator:**
  + Takes a user-specified upper limit and generates all prime numbers up to that limit.
  + Displays the generated prime numbers in a list.
* **User Input and Interaction:**
  + The program prompts the user to input a number for checking primality.
  + The user is also prompted to input an upper limit for generating prime numbers.
  + Error handling is implemented to ensure that the user provides valid integer inputs.

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|  | **Methodology**   1. **Prime Number Checker (is\_prime)**: The function is\_prime(n) checks whether the input number n is prime or not. The function works by:    * Returning False for numbers less than or equal to 1, as they are not prime.    * Iterating from 2 to the square root of n and checking if any number divides n evenly (i.e., has a remainder of 0). If such a number is found, n is not prime, and the function returns False.    * If no divisor is found, the number is prime, and the function returns True. 2. **Prime Number Generator (generate\_primes)**: The function | **generate\_primes(limit) generates all prime numbers up to the specified limit by iterating from 2 to limit. For each number, it calls the is\_prime function to check if the number is prime. If it is, the number is added to a list of primes.**  **3 User Input and Error Handling**: The program prompts the user to input:   * + A number to check if it is prime.   + A limit up to which prime numbers should be generated |  |
|  | Code Implementation A screenshot of a computer program  AI-generated content may be incorrect. | A computer screen shot of a function  AI-generated content may be incorrect. |  |
|  | A screen shot of a computer program  AI-generated content may be incorrect. | |  |

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|  | **7. Conclusion**  This project successfully implements both a prime number checker and generator. It meets the objectives of:   * Checking the primality of a number. * Generating prime numbers up to a specified limit. * Providing a user-friendly interface with input prompts and handling invalid inputs gracefully.   Future improvements could include optimizing the primality check for larger numbers (using algorithms like the Sieve of Eratosthenes), allowing for batch prime number checking, and generating primes in different formats (such as a graphical representation). |  |  |

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