Champernowne Constant

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SOEN 6481: SOFTWARE SYSTEMS REQUIREMENTS SPECIFICATION

Objectives

- To familiarize the audience with Champernowne constant.
- To share my learnings and challenges faced during the course of the project.
- To give an overview of the calculator developed as a part of this project.

Introduction

Champernowne Constant (C_{10})

- Named after economist and mathematician D. G. Champernowne.
- Is a transcendental real constant whose decimal expansion has important properties.
- For base 10, this number is a normal number.
- This constant is interesting because any given sequence of numbers can be shown to exist somewhere in the Champernowne representation.

Figure 1: David Gawen Champernowne, 1912-2000

Calculator

Overview

- Used for generating Champernowne Constant to given decimal places based on the users' input.
- Could also be used for performing basic mathematical calculations on positive numbers.
- Developed in Java using Swing (GUI) widget toolkit.

Key Functionalities

- Generating Champernowne Constant.
- Calculating the position of the first occurrence of a given number in the generated Champernowne Constant.
- Calculating the total number of occurrences of a given number in the generated Champernowne Constant.
- Retrieving the last generated Champernowne Constant in the input field to perform basic calculations.

User Interface

The UI of the calculator includes:

- Output screen
- Input field
- Number and Operation keys
- Instruction screen

Champernowne Constant

For base 10, the number is defined by concatenating representations of successive integers.

$$C_{10} = 0.12345678910111213141516...$$

Did you know?

Champernowne's Constant fooled early programs meant to check if certain sequences of numbers were truly random.
The programs searched to see if each one-digit number, two-digit number, three-digit number and so on showed up as often as it should have if the numbers were truly random, and they did.

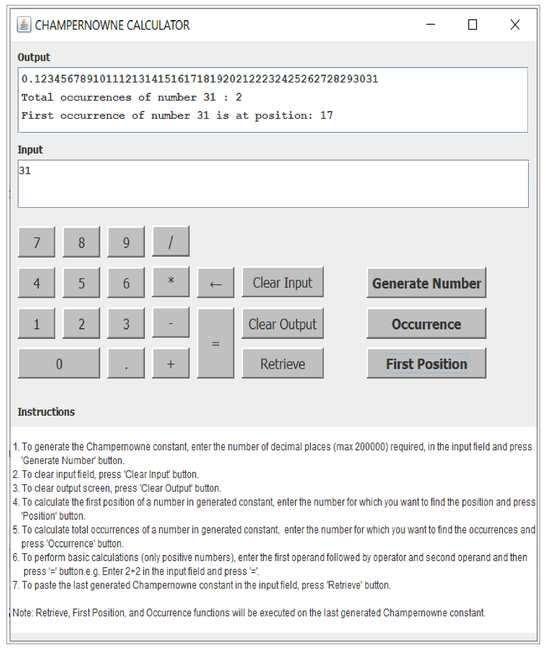

Figure 2: Champernowne Calculator

Challenges

- Learning Latex and proper usage of packages.
- Preparing good questionnaires for interviews was a time-consuming process.
- Difficulties faced while scheduling interviews because of the time difference between India and Canada.
- Embedding persona template in Latex code was a bit challenging.
- Finding out extend and include relationships was a slightly intricate task.

Learnings

- Insightful knowledge about Champernowne Constant.
- Learned about transcendental numbers and normal numbers.
- Hands-on experience of Latex code.
- Significant improvements in documentation skills.
- Defining target users for our envisioned end product in Persona.
- Gained knowledge on how to document project artifacts for the envisioned end product.
- Practical implementation of different project artifacts like Domain Model, Use Case model, User Stories, etc.

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