



CS4051NI Fundamentals of Computing

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Student Name: Samir Yadav

London Met ID: 23048505

College ID: np01ai4a230003

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Introduction

As a general-purpose programming language, it is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, makes it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The python interpreter and the extensive standard library is available in source or binary form without charge for all major platforms and can be freely distributed. Python's universality and ability to operate on practically every system architecture make it a universal language used in a wide range of applications. (Python, n.d.)

The coursework is related to the development of an application based on Land Rental System where customer can rent and return the land after the termination of the contract. To rent the customers have to provide their name. The main objective of the project is to provide facilities related to the land rental system which makes it a little bit easier to manage the rental system. Where the customer can easily rent the land and all detail are kept in a txt file. At first, we have to choose the value to rent the land. When we choose to rent the land it asks the name of the renter after we choose land id to rent. If that is unavailable then the customer cannot rent the land and has to choose another land. At least there should be a land available to rent. After selecting the land Id it shows the price, place and direction its facing. And a bill is generated when the customer rents a land for some months. At last customers return bill is shown and written in a text file.

The main objective of the project is to provide facilities related to the land rental system which makes it a little bit easier to manage the rental system. Where a customer can easily rent a land.

Discussion and Analysis

2.1 Algorithm

For algorithms, there are a series of instructions designed to accomplish some activity. Algorithms are commonly implemented as functions in computer programming. Small programs, these functions can be referenced from a larger program. Algorithms for image processing may be included in an image editing program. Algorithms are commonly implemented as functions in computer programming. Small programs, these functions can be referenced from a larger program. It provides instructions for solving programs programmatically.

It is uncommon for a software application to have many ways to do the same action in different ways determining which algorithms are the most efficient is hence a common goal for programmers. It is feasible for developers to ensure that their programs run as fast as possible while consuming the least amount of system resources by implementing highly efficient algorithms. Software that has been “optimized” or boasts “better performance” is likely to have more efficient algorithms than older versions. (Christensson, 2013)

Algorithm for program of Land Rental System is given below:

- step 1: Start
- step 2: Display welcome message
- step 3: Open info.txt in reading mode
- step 4: Display all the details of land in tabel form
- step 5: Display message “Enter ‘1’, ‘2’ and ‘3’ ”.
- step 6: Take input from the user.
- step 7: “Enter ‘1’ to rent a land”.
- Step 8: “Enter ‘2’ to return the land”.
- Step 9: “Enter ‘3’ to exit the system”.
- step 10: If customer provides 1 as input, then go to step 13.
- step 11: If customer provides 2 as input, then go to step 31.
- step 12: If customer provides 3 as input, then the program will exit and then display “Thank you for using TechnoPropertyNepal Rental System” and go to step 44.
- Step 13: Ask the customer to input valid kitta number.
- Step 14: If customer provides valid land id then go to next step Else go to set 13 again.
- step 15: Take input from the customer for the duration in months.
- step 16: Check if the provided kitta number is available or not.
- step 17: If the provided kitta number is available then go to next step else go back to step 13.

- step 18: Display date and time of borrow.
- step 19: Update the status of the land from available to Not available after renting.
- step 20: Open textfile in writing mode.
- step 21: Display all the land details after renting.
- step 22: Open data file in reading mode.
- Step 23: Take input from the customer if they want to rent more land.
- Step 24: “Enter ‘y’ to rent more land”.
- Step 25: “Enter ‘n’ to not rent any more land”.
- Step 26: If customer provides y as input, then go to step 13.
- Step 27: If customer provides n as input, then go to next step.
- Step 28: Display all the details of customer along with rented land details.
- Step 29: Go back to step 4.
- Step 30: Display message “Enter ‘1’, ‘2’ and ‘3’ ”.
- Step 31: Take input valid kittta number to return land.
- Step 32: Take input customer name.
- Step 33: Take input from the customer about number of months the land was rented.
- Step 34: Check whether the returned land status is available or not available.
- Step 35: If provided kittta number to return is not available then go to next step else go back to step 31.
- Step 36: Display total amount and customer details.
- Step 37: Take input from the customer if they want to return more land.
- Step 38: If customer provides input as ‘y’ then go to step 31.
- Step 39: If customer provides input as ‘n’ then go to next step.
- Step 40: Display billing details.
- Step 41: Go back to step 4.
- Step 42: End.

2.2 Flow Chart

Flow Chart's are the visual representations of various computer logic phases. They employ arrows to depict a step-by-step process and geometric shapes to establish a data flow. As the name suggests, the program flowchart is a representation of a program's data flow as it is written. It helps the user to easily describe the procedure to others while working together. Programmers often use it as a program-planning tool to solve a problem. It makes use of symbols which are connected among them to indicate the flow of information and processing. And the process of drawing a flowchart for an algorithm is known as flowcharting. It is possible to use the flowcharts for a variety of purposes. Examples include analyzing codes and working on them. Different types of boxes are used to make flowcharts symbols. All the different kinds of boxes are connected by arrow lines. Arrow lines are used to display the flow of control.

They improve the quality and efficiency of work. To program, it has different type of boxes that are used to make flowcharts such as terminal box is an oval shape which is used to indicate the start or end of the program. A parallelogram- shaped box in which the inputs or outputs are written. There is also a rectangle box in which a programmer writes the main course of action of the algorithm or the main logic of the program. Also there is a rhombus-shaped box, control statements like if, condition like $a>0$, etc are written inside this box. Symbols such as start, prprocess, decision, and end are used in programming flowcharts to represent commands. (Pradipta, 2023)

The flow chart for Land Rental System is given below:

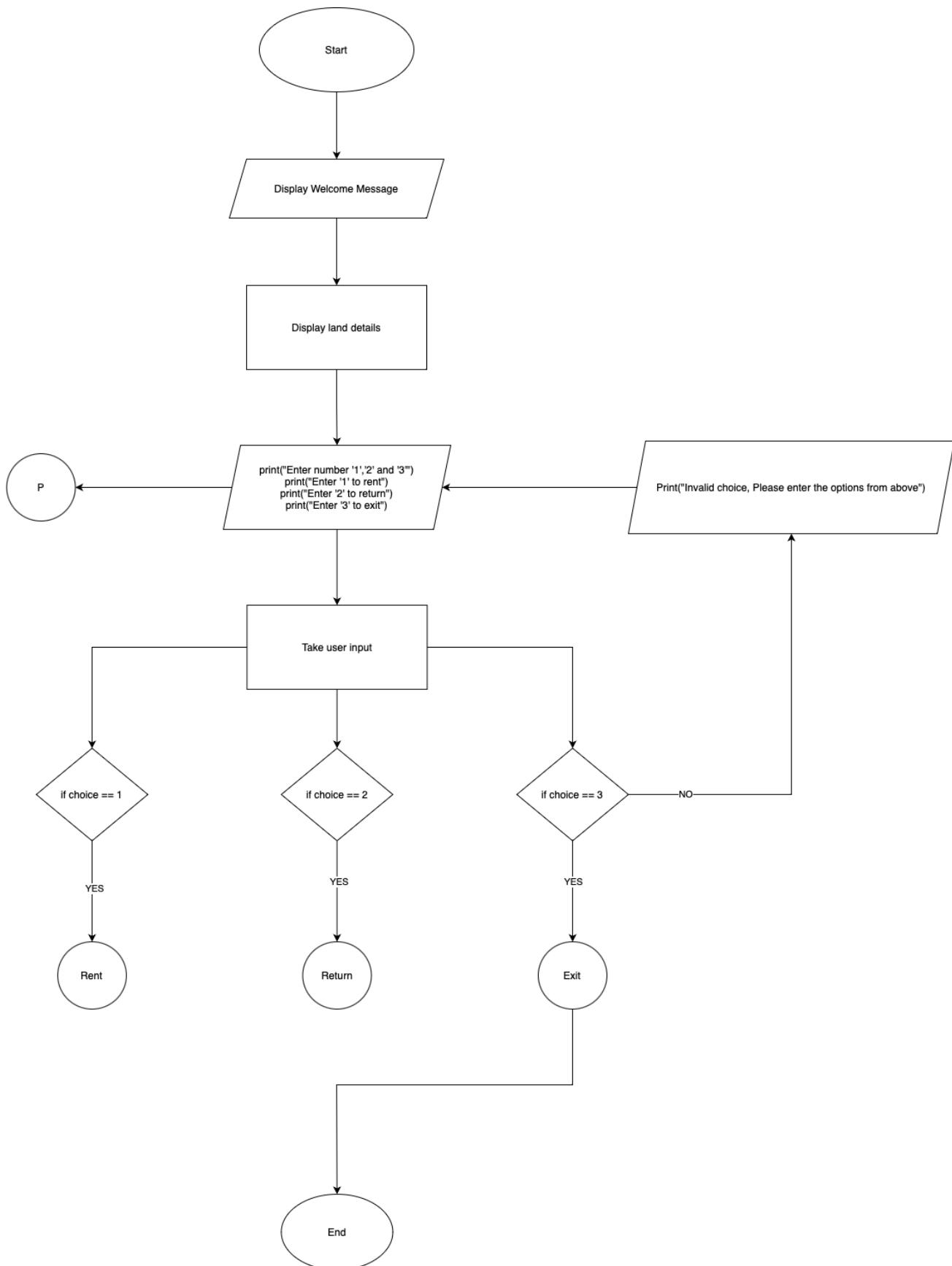


Figure 1: Screenshot of flowchart of program 1.

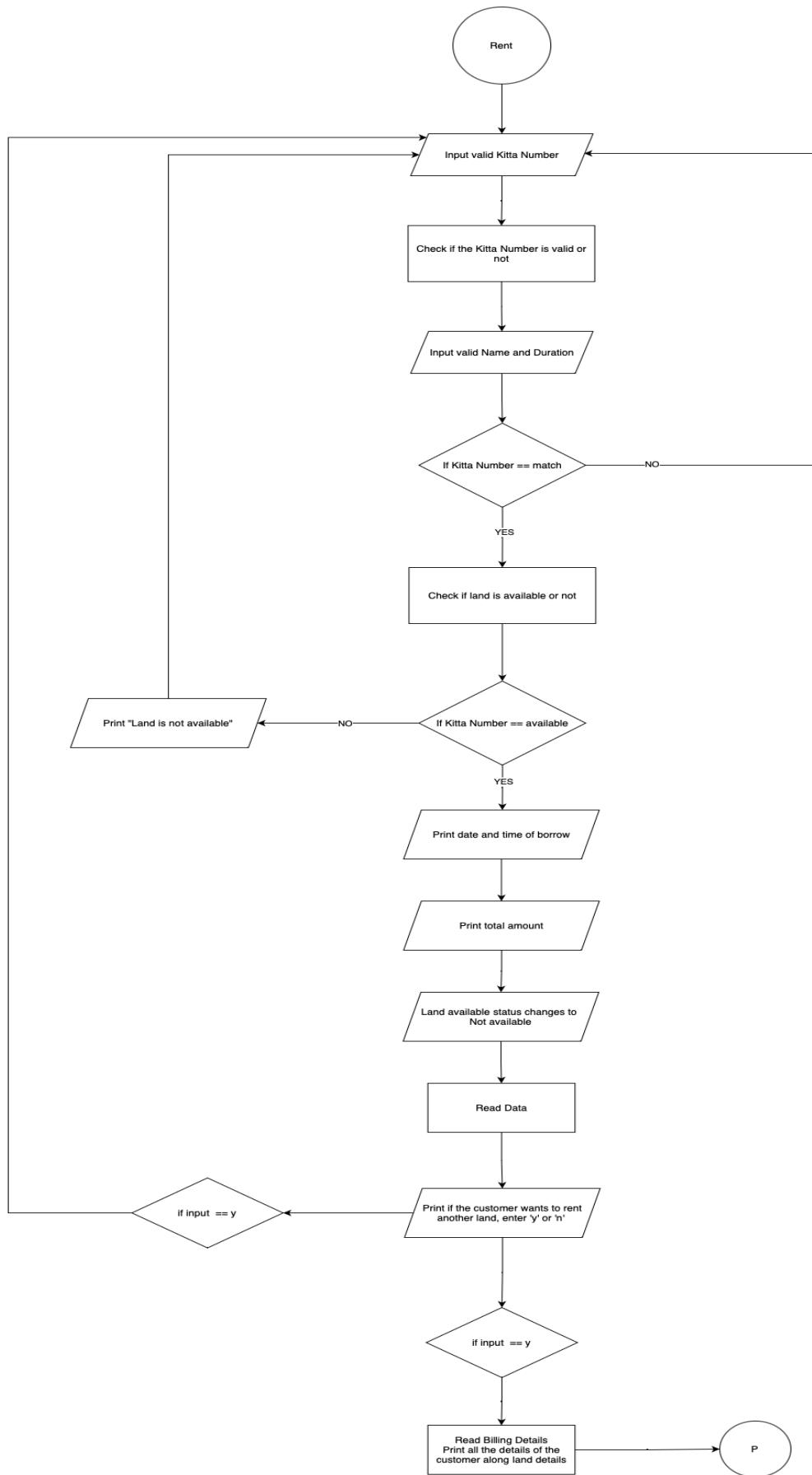


Figure 2: Screenshot of program 2.

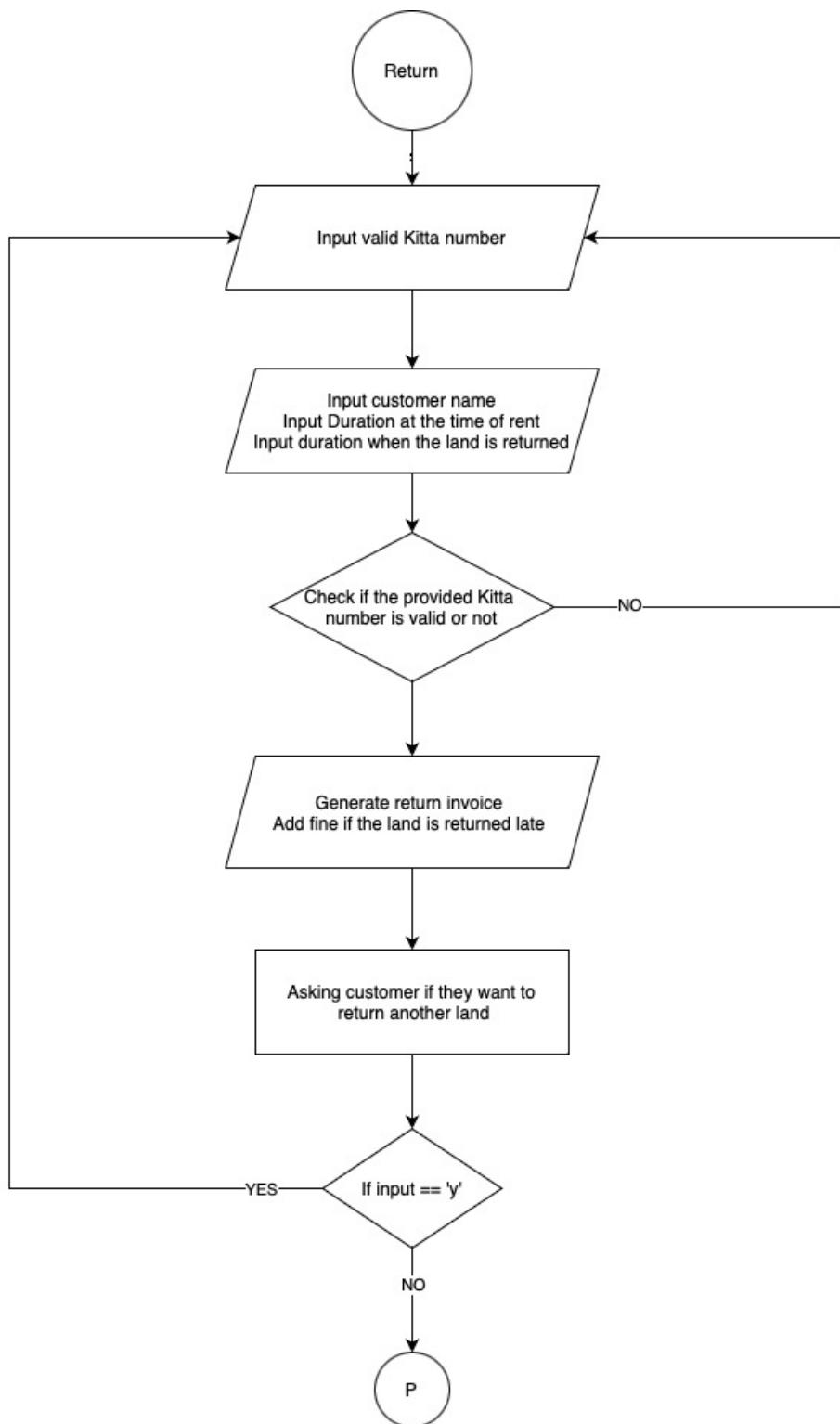


Figure 3: Screenshot of program 3

2.3 Pseudocode

A pseudocode is defined as a step-by-step description of an algorithm. Pseudocode does not use any programming language in its representation instead it uses the simple english language text as it is intended for human understanding rather than machine reading. In addition to allowing designers or lead programmers to communicate the design in great detail, it also gives programmers a precise template for the next step of developing code in a certain programming language.

Pseudocode is an important part of designing an algorithm, it helps the programmer in planning the solution to the problem as well as the reader in understanding the approach to the problem. Once the pseudocode is accepted, it is rebuilt in a programming language's vocabulary and grammer. (GeeksforGeeks, 2023)

The pseudocode for Land Rental System is given below:

Pseudocode of main.py:

```

From operations Import everything
Import datetime
x= date.time.datetime.now()
Output + repeated 100
Output Hello and Welcome to Techno-Nepal Land Management System
Output + repeated 100
function main()
    while True
        Call Display_land_data()
        Output Enter '1' to rent a land
        Output Enter '2' to return the land
        Output Enter '3' to exit
        Input choice from user Output Enter the numbers to rent, return or exit
        If choice is equal to '1'
            Call function rent_land()
            Call function loop_()
        elif choice is equal to '2'
            Call function return_land()
            Call function loop_return()
        elif choice is equal to '3'
            Call function exit()
            break
        Else
            Output Invalid choice, Please enter the options from above

If __name__ is equal to __main__
    Call function main()

```

Pseudocode of operations.py:

Import functions `read_info`, `update_availability`, `generate_rent_invoice`, `generate_return_invoice` from respective modules

Function `display_land_data()`

 lands is equal to Call `read_info` function with argument "info.txt"

 Print newline followed by "Land Information:" Print formatted table headers for
 "Kitta Number", "City/District", "Direction", "Area (anna)", "Price (NPR)",
 "Availability"

 For each land in lands

 kitta_number = Get value of "Kitta Number" attribute from land or
 default to "N/A"

 city_district = Get value of "City/District" attribute from land or
 default to "N/A"

 direction = Get value of "Direction" attribute from land or default to
 "N/A"

 area = Get value of "Area (anna)" attribute from land or default to
 "N/A"

 price = Get value of "Price (NPR)" attribute from land or default to
 "N/A"

 availability = Get value of "Availability" attribute from land or default
 to "N/A"

 Print formatted string with `kitta_number`, `city_district`, `direction`,
 `area`, `price`, and `availability`

Function `get_land_by_kitta_number(file_name, kitta_number)`

 lands = Call `read_info` function with argument `file_name`

 For each land in lands

 If Convert "Kitta Number" attribute of land to integer and compare
 with given `kitta_number`

 Return land

 Return None

Function `rent_land()`

 Call `display_land_data` function

 While True

 Try

`kitta_number` = Convert input("Enter the Kitta Number of the land
 you want to rent: ") to integer

 If `kitta_number` is between 201 and 215

 Break out of the loop

 Else

 Print error message "Error: Please enter a number
 between 201 and 215."

 Except `ValueError`

 Print error message "Error: Invalid input. Please enter a valid
 integer."

 While True

 Try

`rented_duration` = Convert input("Enter the duration of rent (in
 months): ") to integer

```

        If rented_duration is greater than 3
            Break out of the loop
        Else
            Print error message "Error: Duration must be above 3
months"
        Except Exception
            Print error message "Please enter the duration in months only!!!"
customer_name = input("Enter your name: ")
land = Call get_land_by_kitta_number function with arguments "info.txt" and
kitta_number
If land exists and land.get("Availability") is "Available"
    rented_lands = [land]
    Call generate_rent_invoice function with arguments customer_name,
rented_lands, and rented_duration
    Call update_availability function with arguments "info.txt", kitti_number,
and "Not Available"
    Print "-" repeated 100 times
    Print formatted string confirming successful rental of land with
kitta_number and rented_duration months
    Print "-" repeated 100 times
Else if land does not exist
    Print "-" repeated 100 times
    Print "Land with the provided Kitta Number does not exist."
    Print "-" repeated 100 times
Else
    Print "-" repeated 100 times
    Print "The land is currently not available for renting."
    Print "-" repeated 100 times

```

Function loop_()

```

Print "Do you want to rent another land?"
Continue = input("Enter 'y' to continue or 'n' for rental details: ")
If Continue is "y"
    Call rent_land function
Else if Continue is "n"
    Return
Else
    Print "+" repeated 80 times
    Print "Please provide value in 'y' or 'n' only!!!" # Print error message for
invalid input
    Print "+" repeated 80 times
Return loop_

```

Define return_land() function

Call display_land_data() to show land data

Loop indefinitely

Try

```

Prompt user to enter the Kitta Number of the land to return
Convert input to integer and assign to kitta_number
If kitta_number is between 201 and 215 inclusive
    Break the loop
Else
    Print error message: "Error: Please enter the kitta
    number correctly which you have rented."
Catch ValueError
    Print error message: "Error: Invalid input. Please enter a valid
    integer."

Prompt user to enter their name and assign to customer_name

Loop indefinitely
Try
    Prompt user to enter the duration of land rented
    Convert input to integer and assign to rented_duration
    If rented_duration is greater than 3
        Break the loop
    Else
        Print error message: "Error: Duration must be above 3
        months"
    Catch Exception
        Print error message: "Please enter the duration in months only!!!"

Loop indefinitely
Try
    Prompt user to enter the duration of land returned
    Convert input to integer and assign to return_duration
    If return_duration is greater than 3
        Break the loop
    Else
        Print error message: "Error: Duration must be above 3
        months"
    Catch Exception
        Print error message: "Please enter the duration
        in months only!!!"

Call get_land_by_kitta_number("info.txt", kitta_number) to get land information and
assign to land
If land is found and land's Availability is "Not Available"
    Calculate fine_amount_per_month as float(land.get("Price (NPR)", "0")) *
    0.1
    If return_duration is greater than rented_duration
        Calculate months_late as return_duration - rented_duration
        Calculate total_fine as fine_amount_per_month * months_late
        Print message: "The land was returned late by months_late
        months. So, fine of NPR total_fine was applied."
    Else
        Set total_fine to 0

```

```

Print message: "The land was returned on time or early. So, no
fine was applied."
Create returned_lands list containing the land
Call generate_return_invoice(customer_name, returned_lands,
fine_amount=0) Call update_availability("info.txt", kitta_number,
"Available")
Print message: "Land with Kitta Number kitta_number has been returned
successfully."
Else If land is not found
    Print message: "Land with the provided Kitta Number does not exist."
Else
    Print message: "The land is not currently rented."

```

Define loop_return() function

```

Print message: "Do you want to return another land?"
Prompt user to enter 'y' or 'n' to continue and assign to continue_
If continue_is 'y'
    Call return_land()
Else If continue_is 'n'
    Return from function
Else
    Print error message: "Please provide value in 'y' or 'n' only!!"
    Call loop_return() to retry

```

Define exit() function

```

Print empty line
Print "Thank you for using our Land management system" with border
Return from function

```

Pseudocode of read.py:

```

Function read_info(file_name)
    Initialize lands as an empty list
    Open file_name for reading as file
        headers is equal to split the first line of file after stripping whitespace and
        splitting by ','
        For each line in file
            land_data equal to Split line after stripping whitespace and
            splitting by ','
            land equal to Create a dictionary using headers as keys and
            land_data as values
            Append land to lands list
    Retrun lands

```

Pseudocode of write.py:

Import datetime module for date and time operations

```

Function update_availability(file_name, kittt_number, status)
    Initialize lines as an empty list
    Open file_name for reading as file
        headers equal to split the first line of file after stripping whitespace and
        splitting by ','
        Append ','.join(headers) +'\n' to lines list
        For each line in file
            land_data equal to Split line after atripping whitespace and
            splitting by ','
            If Convert land_data[0] to integer and compare with kittt_number
                Set land_data[-1] to status
                line equal to ','.join(land_data) +'\'n'
            Append line to lines list

    Open file_name for writing as file
        Write lines to file

Function generate_rent_invoice(customer_name, rented_lands, rented_duration)
    Set total_amount to 0
    For each land in rented_lands
        Set price to float(land.get("Price (NPR)", "0"))
        Add (price * rented_duration) to total_amount

    Set current_date_time to current date and time formatted as
    'YYYYMMDDHHMMSS'
    Set invoice_name to customer_name + "_rent_invoice_" + current_date_time +
    ".txt"
    Open invoice_name in write mode as file
        Write "Rent Invoice\n" to file
        Write "Customer Name: " + customer_name to file
        Write "Date and Time of Rent: " + current date and time formatted as
        'YYYY-MM-DD HH:MM:SS' to file
        Write "Rented Lands:\n" to file

        For each land in rented_lands
            Write "Kitta Number: " + land.get('Kitta Number', 'N/A') to file
            Write ", City/District: " + land.get('City/District', 'N/A') to file
            Write ", Direction: " + land.get('Direction', 'N/A') to file
            Write ", Area: " + land.get('Area (anna)', 'N/A') + " anna\n" to file

        Write "Duration of Rent: " + rented_duration + " months\n" to file
        Write "Total Amount: NPR " + total_amount to file

    Print "Rent Invoice"
    Print "Customer Name: " + customer_name
    Print "Date and Time of Rent: " + current date and time formatted as 'YYYY-MM-
    DD HH:MM:SS'
    Print "Rented Lands:"

```

For each land in rented_lands
 Print "Kitta Number: " + land.get('Kitta Number', 'N/A')
 Print "City/District: " + land.get('City/District', 'N/A')
 Print "Direction: " + land.get('Direction', 'N/A')
 Print "Area: " + land.get('Area (anna)', 'N/A') + " anna"

Print "Duration of Rent: " + rented_duration + " months"
 Print "Total Amount: NPR " + total_amount
 Return total_amount

Define generate_return_invoice(customer_name, returned_lands, fine_amount) function
 Set current_date_time to current date and time formatted as
 'YYYYMMDDHHMMSS'
 Set invoice_name to customer_name + "_return_invoice_" + current_date_time + ".txt"

Open invoice_name in write mode as file
 Write "Return Invoice\n" to file
 Write "Customer Name: " + customer_name to file
 Write "Date and Time of Return: " + current date and time formatted as
 'YYYY-MM-DD HH:MM:SS' to file
 Write "Returned Lands:\n" to file
 For each land in returned_lands
 Write "Kitta Number: " + land.get('Kitta Number', 'N/A') to file
 Write ", City/District: " + land.get('City/District', 'N/A') to file
 Write ", Direction: " + land.get('Direction', 'N/A') to file
 Write ", Area: " + land.get('Area (anna)', 'N/A') + " anna\n" to file

If fine_amount > 0
 Write "Fine Amount: NPR " + fine_amount to file

Print "Return Invoice"

Print "Customer Name: " + customer_name

Print "Date and Time of Return: " + current date and time formatted as 'YYYY-MM-DD HH:MM:SS'

Print "Returned Lands:"

For each land in returned_lands

Print "Kitta Number: " + land.get('Kitta Number', 'N/A')
 Print "City/District: " + land.get('City/District', 'N/A')
 Print "Direction: " + land.get('Direction', 'N/A')
 Print "Area: " + land.get('Area (anna)', 'N/A') + " anna"

If fine_amount > 0
 Print "Fine Amount: NPR " + fine_amount

2.4 Data Structure

Data structure are a way of organizing data so that it can be accessed more efficiently depending upon the situation. Data Structures are fundamentals of any programming language around which a program is built. Python helps to learn the fundamental of these data structures in a simpler way as compared to other programming languages. A variety of data structures have been developed to allow both data scientists and computer engineers to focus on the bigger picture of addressing problems rather than getting bogged down. (GeeksforGeeks, 2023)

There are two types of data structure primitive data structure and non-primitive data structure:

1. Primitive Data Structure:

Primitive data structure is a data structure that can hold a single value in a specific location which is defined as the basic foundation for generating more complicated data kinds. The following are the four primitive data structures:

i. Integer:

The integer data type contains the numeric information. Numbers can be either positive or negative. In the given screenshot, The integer is used to convert the string value of quantity into an integer for comparing the previous and current quantity of the land of specific kitta number.

ii. Boolean:

This data type is mostly used to check whether the given conditions are true or false as it is used to store either True or False values in the data. The data type is used to repeat the loop if there occurs any error while running the program. If there's no error then the loop will not work.

iii. Float:

Float is a data type that can hold decimal values and when the precision of decimal values increases then the Double data type is used because floating-point data has two types : float and double. Whenever the decimal precision increases double is used. likewise, the float is used to convert the price of the land of chosen kitta number into float because it includes the decimal so it cannot be converted into an integer in the provided screenshot.

iv. Character:

It is a collection of character strings. It is a data type that can hold a single character value of both upper and lower case alphabetic characters in their literal form.

2. Non-Primitive Data Structure:

The non-primitive data structure is a kind of data structure that can hold multiple values either in a contiguous or random location. This type of data types are defined by the programmer. When we define a non-primitive data type variable, we are referring to a memory location in the heap memory where data is kept. (Javatpoint, n.d.)

The different types of Non-Primitive Data are described below:

i. **Tuple:**

Tuple allows a user to store multiple elements in a single variable. It is a collection of mutable and immutable items. Tuples are generally denoted or addressed by round bracket "()".

ii. **Dictionary:**

Dictionary in python is a data structure, used to store values in key format. In the code, each key and its value are separated by a colon(:), items are separated by commas, and everything is surrounded in curly brackets. However, a dictionary's keys data must be immutable data types like strings, numbers, or tuples for the dictionary's value to function properly. (GeeksforGeeks, 2024)

iii. **List:**

List is a collection of things and are enclosed in [] which is then separated by commas. Each thing can be of a distinct sort, and the number of items can be unlimited (integer, float, string, etc.). (GeeksforGeeks, 2024)

Program

When running the program at first it displays the message Welcoming the customer. It shows the total details of land including kitta number, availability, price, place, direction its facing and the anna. It displays messages to guide the customer for what to input for renting, returning and exiting the system. It takes the input from the user in 1, 2, and 3 values as given in the below screenshot.

```
Python 3.12.2 (v3.12.2:609d999, Feb  6 2024, 17:02:00) [Clang 15.0.0 (clang-1500.0.29.50)] on darwin
Type "help", "copyright", "credits" or "license()" for more information.

>>> ===== RESTART: /Users/samiryadav/Desktop/23048505_SAMIR YADAV/main.py =====
+++++ Hello and Welcome to Techno-Nepal Land Management System +++++
+++++ Land Information: +++++
Kitta Number City/District Direction Area (anna) Price (NPR) Availability
201 Kathmandu North 6 55000 Available
202 Pokhara East 7 65000 Not Available
203 Lalitpur South 12 120000 Not Available
204 Bhaktapur West 10 90000 Available
205 Biratnagar East 8 75000 Available
206 Butwal West 9 80000 Available
207 Dharan East 7 65000 Available
208 Bharatpur Central 11 95000 Not Available
209 Birgunj South 5 50000 Available
210 Hetauda Central 6 55000 Available
211 Nepalgunj West 8 70000 Available
212 Dhangadhi Far-West 5 45000 Available
213 Janakpur East 10 85000 Available
214 Tulsipur Mid-West 7 60000 Not Available
215 Ilam East 9 70000 Not Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit:
```

Figure 4: Screenshot after running program

If the user provides values other than 1, 2, and 3 it displays an alert message commanding to input value 1, 2, or 3 only. It is due to Try and except. Let us input string value “Samir” and an integer other than 1, 2 or 3 which is “4” and press enter.

```
Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: Samir
```

```
Invalid choice, Please enter the options from above.
```

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Not Available

```
Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
```

```
Enter the numbers to rent, return or exit: |
```

When the customer enters value 1 then the program asks the user to input the Kitta Number of the land.

```
' Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: 1
```

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Not Available

```
Enter the Kitta Number of the land you want to rent:
```

Figure 5: Screenshot of program asking user to input the Kitta Number

when the customer enters the Kitta Number of the land it asks customer to enter their name.If the user provides value other than valid land id like 201-215 then the error message appears commanding to provide valid input land id. Let us enter integer '4' and string value "Samir" to check to try and except is working properly or not.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Not Available

Enter the Kitta Number of the land you want to rent: 4

Error: Please enter a number between 201 and 215.

Enter the Kitta Number of the land you want to rent: |

Figure 6: Screenshot for checking try and except

If the customer provides the land id whose status is available then the renter can rent the land otherwise program displays a message telling that the land is not available and asks to choose another land id.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Not Available

Enter the Kitta Number of the land you want to rent: 4

Error: Please enter a number between 201 and 215.

Enter the Kitta Number of the land you want to rent: 202

Enter the duration of rent (in months): 54

Enter your name: Samir Yadav

The land is currently not available for renting.

Do you want to rent another land?

Enter 'y' to continue or 'n' for rental details:

Figure 7: Screenshot for checking valid land id

When the customer provides an available land id then it displays the price, date and time of the land rented, and after again the table of land details is showed.

```

Enter the Kitta Number of the land you want to rent: 201
Enter the duration of rent (in months): 67
Enter your name: Samir Yadav

Rent Invoice
Customer Name: Samir Yadav
Date and Time of Rent: 2024-07-23 19:09:14
Rented Lands :
Kitta Number: 201, City/District: Kathmandu, Direction: North, Area: 6 anna
Duration of Rent: 67 months
Total Amount: NPR 3685000.0

```

Land with Kitta Number 201 has been rented successfully for 67 months.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Not Available

Figure 8: Screenshot for asking input from the customer if they want to rent more land

The customer has to enter input in 'y' to rent more lands and 'n' to stop renting which later shows rented details. If customer provides value other than 'n' or 'y' than it shows the error message to input value in 'y' or 'n' only. Let us provide input other than 'y' or 'n' that is 't'.

```

Do you want to rent another land?
Enter 'y' to continue or 'n' for rental details: t
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Please provide value in 'y' or 'n' only!!
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Land Information:
Kitta Number      City/District    Direction   Area (anna)  Price (NPR)  Availability
201               Kathmandu        North       6           55000      Not Available
202               Pokhara          East        7           65000      Not Available
203               Lalitpur         South      12          120000     Not Available
204               Bhaktapur        West       10          90000      Available
205               Biratnagar       East        8           75000      Available
206               Butwal           West       9           80000      Available
207               Dharan            East       7           65000      Available
208               Bharatpur         Central    11          95000      Not Available
209               Birgunj          South      5           50000      Available
210               Hetauda           Central    6           55000      Available
211               Nepalgunj        West       8           70000      Available
212               Dhangadhi         Far-West   5           45000      Available
213               Janakpur          East       10          85000      Available
214               Tulsipur          Mid-West  7           60000      Not Available
215               Ilam              East       9           70000      Not Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit:

```

Figure 9: Screenshot for renting more land

When customer enters 'y' than it asks for the Kitta Number which the customer wants to rent.

DURATION OF RENT: 87 MONTHS
 Total Amount: NPR 7830000.0

Land with Kitta Number 204 has been rented successfully for 87 months.

Do you want to rent another land?

Enter 'y' to continue or 'n' for rental details: y

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Not Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Not Available

Enter the Kitta Number of the land you want to rent:

Figure 10: Screenshot for try and except

If the customer chooses to rent the same land which he/she has already rented than a alert message id displayed to the customer thata they have already rented the land. And again ask that the customer wants to rent other lands or not.

The customer's rented details are displayed which includes all the detail like the name of the cutomer, total price of land, date and time. If customer inputs 'n' then after all the details are written in a unique txt file including rent username and again the details of the land is displayed and again customeris required to input value in 1, 2 or 3 to rent, retun, or exit.

Rent Invoice
 Customer Name: Samir Yadav
 Date and Time of Rent: 2024-07-23 19:15:19
 Rented Lands :
 Kitta Number: 206, City/District: Butwal, Direction: West, Area: 9 anna
 Duration of Rent: 56 months
 Total Amount: NPR 4480000.0

Land with Kitta Number 206 has been rented successfully for 56 months.

Do you want to rent another land?
 Enter 'y' to continue or 'n' for rental details: n

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter '1' to rent a land
 Enter '2' to return the land
 Enter '3' to exit
 Enter the numbers to rent, return or exit: |

Figure 11: Screenshot for terminating the renting process.

If the customer inputs value '2' then a message will be displayed asking the customer to enter kitta number of the land.

202	Pokhara	East	/	65000	Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter '1' to rent a land
 Enter '2' to return the land
 Enter '3' to exit

Enter the numbers to rent, return or exit: 2

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to return: |

Figure 12: Screenshot for returning the land

Let us enter "201" the kitta number to return and then the customer is required to input the number of months for which the land was initially rented and the duration for which the land was rented. Fine is only applied if the customer rents the land for more than initially rented month. The fine is applied 10% of the monthly rent for that land.

```
Enter S to EXIT
Enter the numbers to rent, return or exit: 2
```

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to return: 201

Enter your name: Samir yadav

Enter the duration of land you had taken for renting: 5

Enter the duration of the land you have returned: 10

The land was returned late by 5 months.
So, fine of NPR 27500.0 was applied.

Return Invoice

Customer Name: Samir yadav

Date and Time of Return: 2024-07-26 21:33:23

Returned Lands:

Kitta Number: 201, City/District: Kathmandu, Direction: North, Area: 6 anna

Land with Kitta Number 201 has been returned successfully.

Figure 13: Screenshot for applying fine if late returned.

Now when the customer enters kitta number to return a land an alert message appears if the provided kitta number is invalid. Let us enter “25” as an integer for choosing land id to return to check Try Except.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to return: 25

Error: Please enter the kitta number correctly which you have rented.

Enter the Kitta Number of the land you want to return:

Figure 14: Screenshot for again checking try except

If we provide valid land id then the land is returned and the details of the land including price, land id, status is displayed.

Land Information:						
Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability	
201	Kathmandu	North	6	55000	Available	
202	Pokhara	East	7	65000	Available	
203	Lalitpur	South	12	120000	Not Available	
204	Bhaktapur	West	10	90000	Available	
205	Biratnagar	East	8	75000	Available	
206	Butwal	West	9	80000	Not Available	
207	Dharan	East	7	65000	Available	
208	Bharatpur	Central	11	95000	Not Available	
209	Birgunj	South	5	50000	Available	
210	Hetauda	Central	6	55000	Available	
211	Nepalgunj	West	8	70000	Available	
212	Dhangadhi	Far-West	5	45000	Available	
213	Janakpur	East	10	85000	Available	
214	Tulsipur	Mid-West	7	60000	Not Available	
215	Ilam	East	9	70000	Available	

Enter the Kitta Number of the land you want to return: 203

Enter your name: Rajan Gupta

Enter the duration of land you had taken for renting: 5

Enter the duration of the land you have returned: 5

The land was returned on time or early. So, no fine was applied.

Return Invoice

Customer Name: Rajan Gupta

Date and Time of Return: 2024-07-26 21:37:32

Returned Lands:

Kitta Number: 203, City/District: Lalitpur, Direction: South, Area: 12 anna

Land with Kitta Number 203 has been returned successfully.

Do you want to return another land?

Enter 'y' or 'n' to continue: |

Figure 15: Screenshot for providing valid land id while returning.

After returning the land, customer is asked if he/she wants to return other lands or not. If the customer provides other than 'y' or 'n' then an alert message appears to provide input only 'y' or 'n'.

Let us enter 'b'.

```
Return Invoice
Customer Name: Rajan Gupta
Date and Time of Return: 2024-07-26 21:37:32
Returned Lands:
Kitta Number: 203, City/District: Lalitpur, Direction: South, Area: 12 anna
Land with Kitta Number 203 has been returned successfully.
Do you want to return another land?
Enter 'y' or 'n' to continue: b
+++++++++++++++++++++
Please provide value in 'y' or 'n' only!!
+++++++++++++++++++
Do you want to return another land?
Enter 'y' or 'n' to continue: |
```

Figure 16: Screenshot for returning multiple lands.

If the customer inputs 'y' then again he/she is asked to enter land id to return if he/she selects the same land id which has already returned then an alert message appears showing you have already returned this land. And again asked if he/she has to return any other land.

Land Information:						
Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability	
201	Kathmandu	North	6	55000	Available	
202	Pokhara	East	7	65000	Available	
203	Lalitpur	South	12	120000	Available	
204	Bhaktapur	West	10	90000	Available	
205	Biratnagar	East	8	75000	Available	
206	Butwal	West	9	80000	Not Available	
207	Dharan	East	7	65000	Available	
208	Bharatpur	Central	11	95000	Not Available	
209	Birgunj	South	5	50000	Available	
210	Hetauda	Central	6	55000	Available	
211	Nepalgunj	West	8	70000	Available	
212	Dhangadhi	Far-West	5	45000	Available	
213	Janakpur	East	10	85000	Available	
214	Tulsipur	Mid-West	7	60000	Not Available	
215	Ilam	East	9	70000	Available	

Enter the Kitta Number of the land you want to return: 203

Enter your name: Samir yadav

Enter the duration of land you had taken for renting: 5

Enter the duration of the land you have returned: 5

The land is not currently rented.

Figure 17: Screenshot for returning multiple lands again.

If the user provides another land id to return then the land id will be returned and the status will be changed to Available from Not Available.

Land Information:						
Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability	
201	Kathmandu	North	6	55000	Available	
202	Pokhara	East	7	65000	Available	
203	Lalitpur	South	12	120000	Available	
204	Bhaktapur	West	10	90000	Available	
205	Biratnagar	East	8	75000	Available	
206	Butwal	West	9	80000	Not Available	
207	Dharan	East	7	65000	Available	
208	Bharatpur	Central	11	95000	Not Available	
209	Birgunj	South	5	50000	Available	
210	Hetauda	Central	6	55000	Available	
211	Nepalgunj	West	8	70000	Available	
212	Dhangadhi	Far-West	5	45000	Available	
213	Janakpur	East	10	85000	Available	
214	Tulsipur	Mid-West	7	60000	Not Available	
215	Ilam	East	9	70000	Available	

Enter the Kitta Number of the land you want to return: 206

Enter your name: Samir Yadav

Enter the duration of land you had taken for renting: 4

Enter the duration of the land you have returned: 3

Error: Duration must be above 3 months

Enter the duration of the land you have returned: 4

The land was returned on time or early. So, no fine was applied.

Return Invoice

Customer Name: Samir Yadav

Date and Time of Return: 2024-07-26 21:39:45

Returned Lands:

Kitta Number: 206, City/District: Butwal, Direction: West, Area: 9 anna

Land with Kitta Number 206 has been returned successfully.

Do you want to return another land?

Enter 'y' or 'n' to continue: n

Figure 18: Screenshot for when the land is being returned.

Land Information:						
Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability	
201	Kathmandu	North	6	55000	Available	
202	Pokhara	East	7	65000	Available	
203	Lalitpur	South	12	120000	Available	
204	Bhaktapur	West	10	90000	Available	
205	Biratnagar	East	8	75000	Available	
206	Butwal	West	9	80000	Available	
207	Dharan	East	7	65000	Available	
208	Bharatpur	Central	11	95000	Not Available	
209	Birgunj	South	5	50000	Available	
210	Hetauda	Central	6	55000	Available	
211	Nepalgunj	West	8	70000	Available	
212	Dhangadhi	Far-West	5	45000	Available	
213	Janakpur	East	10	85000	Available	
214	Tulsipur	Mid-West	7	60000	Not Available	
215	Ilam	East	9	70000	Available	

Enter '1' to rent a land
 Enter '2' to return the land
 Enter '3' to exit
 Enter the numbers to rent, return or exit:

Figure 19: Screenshot for when the status changes.

Here as you can see the availability of the land having kitta number 206 changed from not available to available after returning the land.

Then the customer return details including its fine, name and kitta number are displayed and it is written in a unique text file and If the user input is 'n' then the table of lands with its details is displayed and customer has to provide values 1, 2, 3 to rent, return and exit.

Return Invoice						
Customer Name: Samir Yadav						
Date and Time of Return: 2024-07-26 21:39:45						
Returned Lands:						
Kitta Number: 206, City/District: Butwal, Direction: West, Area: 9 anna						
Land with Kitta Number 206 has been returned successfully.						
Do you want to return another land?						
Enter 'y' or 'n' to continue: n						
Land Information:						
Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability	
201	Kathmandu	North	6	55000	Available	
202	Pokhara	East	7	65000	Available	
203	Lalitpur	South	12	120000	Available	
204	Bhaktapur	West	10	90000	Available	
205	Biratnagar	East	8	75000	Available	
206	Butwal	West	9	80000	Available	
207	Dharan	East	7	65000	Available	
208	Bharatpur	Central	11	95000	Not Available	
209	Birgunj	South	5	50000	Available	
210	Hetauda	Central	6	55000	Available	
211	Nepalgunj	West	8	70000	Available	
212	Dhangadhi	Far-West	5	45000	Available	
213	Janakpur	East	10	85000	Available	
214	Tulsipur	Mid-West	7	60000	Not Available	
215	Ilam	East	9	70000	Available	

Enter '1' to rent a land
 Enter '2' to return the land
 Enter '3' to exit
 Enter the numbers to rent, return or exit:

Figure 20: Screenshot for end of the program

Finally, if the user inputs the value '3' then a message displaying thank you for using our land rental system is displayed and the program is ended.

Land Information:						
Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability	
201	Kathmandu	North	6	55000	Available	
202	Pokhara	East	7	65000	Available	
203	Lalitpur	South	12	120000	Available	
204	Bhaktapur	West	10	90000	Available	
205	Biratnagar	East	8	75000	Available	
206	Butwal	West	9	80000	Available	
207	Dharan	East	7	65000	Available	
208	Bharatpur	Central	11	95000	Not Available	
209	Birgunj	South	5	50000	Available	
210	Hetauda	Central	6	55000	Available	
211	Nepalgunj	West	8	70000	Available	
212	Dhangadhi	Far-West	5	45000	Available	
213	Janakpur	East	10	85000	Available	
214	Tulsipur	Mid-West	7	60000	Not Available	
215	Ilam	East	9	70000	Available	

Enter '1' to rent a land

Enter '2' to return the land

Enter '3' to exit

Enter the numbers to rent, return or exit: 3

+++++++++++++++++++++
Thank you for using our Land management system
++++++++++++++++++

Figure 21: Screenshot for exiting the program.

Testing

7.1 Test 1: Showing implementation of try and except

Objective:	To show implementation of try and except.
Action:	The program was run, and following process was carried out. 1. Value '1' was provided for renting the land. 2. Value "b" was entered while entering the kitta number. (Here Try and Except is applied.)
Expected Result:	Error message "Error: Invalid input. Please enter a valid integer!" will be shown.
Actual Result:	Error message "Error: Invalid input. Please enter a valid integer" was shown.
Conclusion:	Test was Successful.

Table 1: Showing implementation of try and except.

```

Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: 1

Land Information:
Kitta Number  City/District  Direction  Area (anna)  Price (NPR)  Availability
201           Kathmandu      North       6            55000        Not Available
202           Pokhara        East        7            65000        Available
203           Lalitpur       South       12           120000       Not Available
204           Bhaktapur     West        10           90000        Available
205           Biratnagar    East        8             75000        Available
206           Butwal         West       9             80000        Not Available
207           Dharan         East       7             65000        Available
208           Bharatpur     Central    11           95000        Not Available
209           Birgunj       South       5             50000        Available
210           Hetauda        Central    6             55000        Available
211           Nepalgunj    West       8             70000        Available
212           Dhangadhi     Far-West   5             45000        Available
213           Janakpur      East       10            85000        Available
214           Tulsipur      Mid-West  7             60000        Not Available
215           Ilam          East       9             70000        Available

Enter the Kitta Number of the land you want to rent: b
-----
Error: Invalid input. Please enter a valid integer.
-----
Enter the Kitta Number of the land you want to rent: |

```

Figure 22: Showing implementation of try and except

7.2 Test 2: Selecting Rent and return option

Objective:	Selecting rent and return option
Action:	The program was run, and input value was asked to rent, return, or exit. And screenshots were taken. 1. Negative value was provided as input. 2. Non existing value except (1, 2, and 3) was provided.
Expected Result:	Error message "Please input valid value!!" will be shown.
Actual Result:	Error message "Please input valid value!!" was shown.
Conclusion:	Test was successful.

Table 2: Selecting Rent and return option

```

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: -1
-----
Invalid choice, Please enter the options from above.
-----
Land Information:
Kitta Number    City/District    Direction    Area (anna)    Price (NPR)    Availability
201            Kathmandu        North         6             55000        Not Available
202            Pokhara         East          7             65000        Available
203            Lalitpur         South         12            120000       Not Available
204            Bhaktapur        West          10            90000        Available
205            Biratnagar        East          8              75000        Available
206            Butwal           West          9              80000        Not Available
207            Dharan            East          7              65000        Available
208            Bharatpur         Central        11            95000        Not Available
209            Birgunj           South         5              50000        Available
210            Hetauda           Central        6              55000        Available
211            Nepalgunj        West          8              70000        Available
212            Dhangadhi         Far-West      5              45000        Available
213            Janakpur          East          10            85000        Available
214            Tulsipur          Mid-West     7              60000        Not Available
215            Ilam               East          9              70000        Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: |

```

Figure 23: Screenshot for providing negative value.

```

Enter '3' to exit
Enter the numbers to rent, return or exit: d
-----
Invalid choice, Please enter the options from above.
-----

Land Information:
Kitta Number    City/District   Direction  Area (anna) Price (NPR)   Availability
201            Kathmandu       North      6           55000        Not Available
202            Pokhara        East       7           65000        Available
203            Lalitpur       South     12          120000       Not Available
204            Bhaktapur      West      10          90000        Available
205            Biratnagar     East      8            75000        Available
206            Butwal         West      9            80000        Not Available
207            Dharan         East      7            65000        Available
208            Bharatpur      Central   11          95000        Not Available
209            Birgunj        South     5           50000        Available
210            Hetauda        Central   6           55000        Available
211            Nepalgunj     West      8           70000        Available
212            Dhangadhi      Far-West  5           45000        Available
213            Janakpur       East      10          85000        Available
214            Tulsipur       Mid-West 7           60000        Not Available
215            Ilam           East      9           70000        Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: |

```

Figure 24: Screenshot for providing string value instead of integer

7.3 Test 3: File generation of renting of lands (Renting multiple lands)

Objective:	To show file generation of renting lands.
Action:	The program was run, and Screenshots were taken. 1. Value '1' was entered for renting the land. 2. Value "202" was entered as the kitta number. 3. 'Samir' was entered as the renter's name. 4. 'y' was entered to rent another land. 5. Value '209' was entered as the kitta number to rent the land.
Expected Result:	After completing the renting process, a unique txt file including renter's name will be generated.
Actual Result:	After completing the renting process, a unique txt file including renter's name was generated.
Conclusion:	Test was successful.

Table 3: File generation of renting of lands.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalganj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to rent: 202

Enter the duration of rent (in months): 56

Enter your name: Samir

Rent Invoice

Customer Name: Samir

Date and Time of Rent: 2024-07-23 19:32:43

Rented Lands :

Kitta Number: 202, City/District: Pokhara, Direction: East, Area: 7 anna

Duration of Rent: 56 months

Total Amount: NPR 3640000.0

Land with Kitta Number 202 has been rented successfully for 56 months.

Do you want to rent another land?

Enter 'y' to continue or 'n' for rental details: |

Figure 25: Screenshot for executing the program

Land with Kitta Number 202 has been rented successfully for 56 months.

Do you want to rent another land?

Enter 'y' to continue or 'n' for rental details: y

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Not Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Not Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Not Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Not Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalganj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Not Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to rent: 209

Enter the duration of rent (in months): 5

Enter your name: Samir

Rent Invoice

Customer Name: Samir

Date and Time of Rent: 2024-07-23 19:33:49

Rented Lands :

Kitta Number: 209, City/District: Birgunj, Direction: South, Area: 5 anna

Duration of Rent: 5 months

Total Amount: NPR 250000.0

Figure 26: Screenshot of renting land

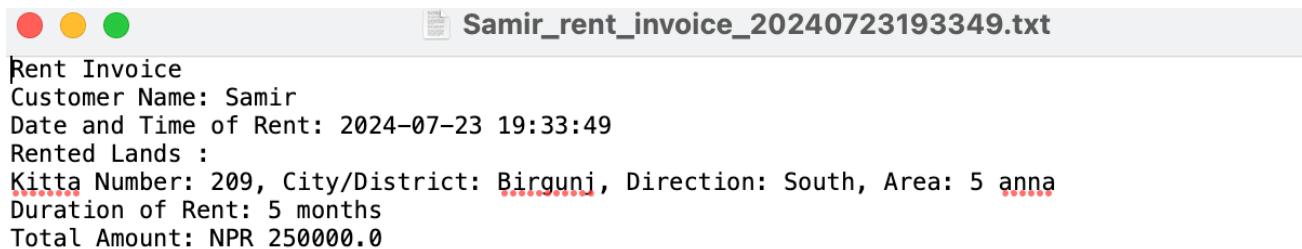


Figure 27: Screenshot of file generation of renting of lands with details.

7.4 Test 4: File generation of returning process of lands (Returning multiple lands)

Objective:	To show file generation of returning process of lands.
Action:	The program was run and screenshots were taken. 1. Value '2' was entered for returning the land. 2. Value " was entered in the land kitta number to return 3. "Samir" was entered in the returner name. 4. '5' months was entered for the no of months land was initially rented for. 5. '5' months was entered for the number of months the land was actually rented. 6. 'y' was entered to return another land. 7. Value '214' was entered in land id to return the land. 8. "Pujan" was entered as the customer name.
Expected Result:	After completing the return process, a unique txt file including returner name will be generated.
Actual Result:	After completing the return process, a unique txt file including returner name was generated.
Conclusion:	Test was successful.

Table 4: File generation of returning process of lands.

```
===== RESTART: /Users/samiryadav/Desktop/23048505_SAMIR YADAV/main.py =====
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Hello and Welcome to Techno-Nepal Land Management System
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Land Information:
Kitta Number   City/District  Direction  Area (anna) Price (NPR) Availability
201           Kathmandu     North       6          55000  Available
202           Pokhara      East        7          65000  Available
203           Lalitpur     South       12         120000 Available
204           Bhaktapur    West        10         90000  Available
205           Biratnagar   East        8          75000  Available
206           Butwal       West        9          80000  Available
207           Dharan       East        7          65000  Available
208           Bharatpur    Central     11         95000  Not Available
209           Birgunj     South       5          50000  Available
210           Hetauda      Central     6          55000  Available
211           Nepalganj    West        8          70000  Available
212           Dhangadhi   Far-West    5          45000  Available
213           Janakpur    East        10         85000  Available
214           Tulsipur    Mid-West   7          60000  Not Available
215           Ilam         East        9          70000  Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: 2

Land Information:
Kitta Number   City/District  Direction  Area (anna) Price (NPR) Availability
201           Kathmandu     North       6          55000  Available
202           Pokhara      East        7          65000  Available
203           Lalitpur     South       12         120000 Available
204           Bhaktapur    West        10         90000  Available
205           Biratnagar   East        8          75000  Available
206           Butwal       West        9          80000  Available
207           Dharan       East        7          65000  Available
208           Bharatpur    Central     11         95000  Not Available
209           Birgunj     South       5          50000  Available
210           Hetauda      Central     6          55000  Available
211           Nepalganj    West        8          70000  Available
212           Dhangadhi   Far-West    5          45000  Available
213           Janakpur    East        10         85000  Available
214           Tulsipur    Mid-West   7          60000  Not Available
215           Ilam         East        9          70000  Available

Enter the Kitta Number of the land you want to return: |
```

Figure 28: Screenshot for returning process where kitta number is asked.

```
Land Information:
Kitta Number   City/District  Direction  Area (anna) Price (NPR) Availability
201           Kathmandu     North       6          55000  Available
202           Pokhara      East        7          65000  Available
203           Lalitpur     South       12         120000 Available
204           Bhaktapur    West        10         90000  Available
205           Biratnagar   East        8          75000  Available
206           Butwal       West        9          80000  Available
207           Dharan       East        7          65000  Available
208           Bharatpur    Central     11         95000  Not Available
209           Birgunj     South       5          50000  Available
210           Hetauda      Central     6          55000  Available
211           Nepalganj    West        8          70000  Available
212           Dhangadhi   Far-West    5          45000  Available
213           Janakpur    East        10         85000  Available
214           Tulsipur    Mid-West   7          60000  Not Available
215           Ilam         East        9          70000  Available

Enter the Kitta Number of the land you want to return: 208
Enter your name: Samir
Enter the duration of land you had taken for renting: 5
Enter the duration of the land you have returned: 5
The land was returned on time or early. So, no fine was applied.

Return Invoice
Customer Name: Samir
Date and Time of Return: 2024-07-26 21:52:09
Returned Lands:
Kitta Number: 208, City/District: Bharatpur, Direction: Central, Area: 11 anna
Land with Kitta Number 208 has been returned successfully.
Do you want to return another land?
Enter 'y' or 'n' to continue: |
```

Figure 29: Screenshot for returning the land

```

Enter the Kitta Number of the land you want to return: 214
Enter your name: Pujan
Enter the duration of land you had taken for renting: 5
Enter the duration of the land you have returned: 5
The land was returned on time or early. So, no fine was applied.

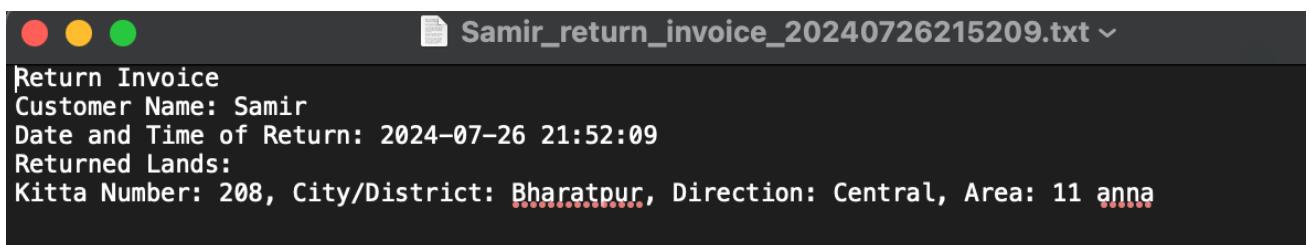
Return Invoice
Customer Name: Pujan
Date and Time of Return: 2024-07-26 21:56:56
Returned Lands:
Kitta Number: 214, City/District: Tulsipur, Direction: Mid-West, Area: 7 anna
Land with Kitta Number 214 has been returned successfully.

Land Information:
Kitta Number    City/District   Direction  Area (anna) Price (NPR)   Availability
201            Kathmandu       North      6          55000   Available
202            Pokhara        East       7          65000   Available
203            Lalitpur       South     12         120000  Available
204            Bhaktapur      West      10         90000   Available
205            Biratnagar     East      8           75000   Available
206            Butwal         West      9           80000   Available
207            Dharan         East      7           65000   Available
208            Bharatpur      Central   11         95000   Available
209            Birgunj        South     5           50000   Available
210            Hetauda        Central   6           55000   Available
211            Nepalgunj     West      8           70000   Available
212            Dhangadhi      Far-West  5           45000   Available
213            Janakpur       East      10          85000   Available
214            Tulsipur       Mid-West  7           60000   Available
215            Ilam           East      9           70000   Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: |

```

Figure 30: Screenshot for the end of program while returning.



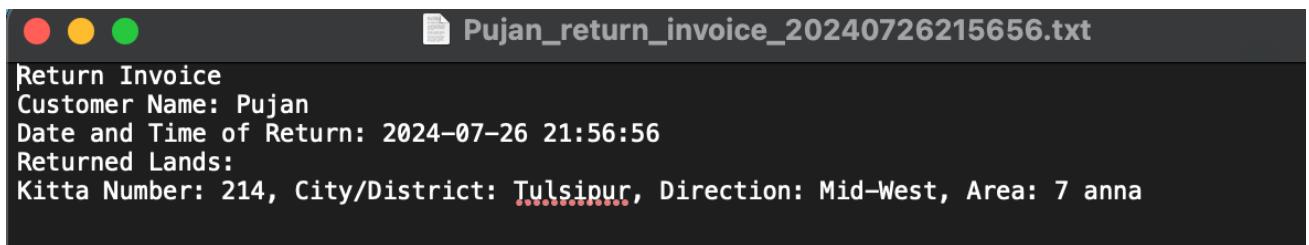
The screenshot shows a terminal window titled "Samir_return_invoice_20240726215209.txt". The content of the window is as follows:

```

Return Invoice
Customer Name: Samir
Date and Time of Return: 2024-07-26 21:52:09
Returned Lands:
Kitta Number: 208, City/District: Bharatpur, Direction: Central, Area: 11 anna

```

Figure 31: Screenshot of the uniques txt file.



The screenshot shows a terminal window titled "Pujan_return_invoice_20240726215656.txt". The content of the window is as follows:

```

Return Invoice
Customer Name: Pujan
Date and Time of Return: 2024-07-26 21:56:56
Returned Lands:
Kitta Number: 214, City/District: Tulsipur, Direction: Mid-West, Area: 7 anna

```

Figure 32: Screenshot of the unique txt file that has been return again.

7.5 Test 5: Show the update in the stock

Objective:	To show the update in the stock.
Action:	<p>The program was run, and screenshots were taken.</p> <ol style="list-style-type: none"> 1. Value '1' was provided for renting the land. 2. Value '202' was entered in the land kitta number to rent. 3. "Ayush" was entered in the renter's name. 4. After renting land the status of the land changed to Not Available from Available. 5. Value '2' was entered for returning the land. 6. Value '202' was entered in land id to return the land. 7. "Sharma" was entered in the returner name. 8. '7' month was entered for the number of months the land was rented.
Expected Result:	After renting the land, the status of the returned land will be changed to Available from Not Available.
Actual Result:	After renting the land, the status of the returned land was changed to Available from Not Available.
Conclusion:	Test was successful.

Table 5: Show the update in the stock.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Available
215	Ilam	East	9	70000	Available

Enter '1' to rent a land

Enter '2' to return the land

Enter '3' to exit

Enter the numbers to rent, return or exit: 1

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to rent: 202

Enter the duration of land you want to rent (in months): 5

Enter your name: Ayush

Rent Invoice

Customer Name: Ayush

Date and Time of Rent: 2024-07-26 22:03:41

Rented Lands:

Kitta Number: 202, City/District: Pokhara, Direction: East, Area: 7 anna

Duration of Rent: 5 months

Total Amount: NPR 325000.0

Land with Kitta Number 202 has been rented successfully for 5 months.

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available

Figure 33: Screenshot for the update in stock

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Available
215	Ilam	East	9	70000	Available

Enter '1' to rent a land
 Enter '2' to return the land

Enter '3' to exit

Enter the numbers to rent, return or exit: 2

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to return: |

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Not Available
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Available
215	Ilam	East	9	70000	Available

Enter the Kitta Number of the land you want to return: 202

Enter your name: Sharma

Enter the duration of land you had taken for renting: 7

Enter the duration of the land you have returned: 7

The land was returned on time or early. So, no fine was applied.

Return Invoice

Customer Name: Sharma

Date and Time of Return: 2024-07-26 22:05:55

Returned Lands:

Kitta Number: 202, City/District: Pokhara, Direction: East, Area: 7 anna
 Land with Kitta Number 202 has been returned successfully.

Do you want to return another land?

Enter 'y' or 'n' to continue: |

Do you want to return another land?
Enter 'y' or 'n' to continue: n

Land Information:

Kitta Number	City/District	Direction	Area (anna)	Price (NPR)	Availability
201	Kathmandu	North	6	55000	Available
202	Pokhara	East	7	65000	Available
203	Lalitpur	South	12	120000	Available
204	Bhaktapur	West	10	90000	Available
205	Biratnagar	East	8	75000	Available
206	Butwal	West	9	80000	Available
207	Dharan	East	7	65000	Available
208	Bharatpur	Central	11	95000	Available
209	Birgunj	South	5	50000	Available
210	Hetauda	Central	6	55000	Available
211	Nepalgunj	West	8	70000	Available
212	Dhangadhi	Far-West	5	45000	Available
213	Janakpur	East	10	85000	Available
214	Tulsipur	Mid-West	7	60000	Available
215	Ilam	East	9	70000	Available

Enter '1' to rent a land
Enter '2' to return the land
Enter '3' to exit
Enter the numbers to rent, return or exit: |

Figure 34: Screenshot of the program where the stock has been updated.

Conclusion

In summary, the creation of TechnoPropertyNepal's Land rental system has been a successful project. This venture taught me multiple things about python such as how to create a text file, use Try and Except, use for loop, while loop etc. However, I did use various functions like rent and return function with for loop in my course work and I used Dictionary,List to keep values and many more. The development process of this program has shown me that planning is very crucial when it comes to software design. It also emphasized on the importance of testing everything thoroughly before considering it complete or working perfectly well because sometimes bugs may hide themselves in certain areas until later stages where they become difficult if not impossible. And without clear documentation good programs can be difficult or impossible to maintain.The experience gained from this project has taught me that technical information needs to be communicated clearly so that others who may come across it will find it easy understand what was done there.

To sum up everything,I am satisfied with all achievements made during this course and believe strongly that through such tasks students get an opportunity not only gain new knowledge but apply them solve different problems as well.

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APPENDIX

1) Code of Main.py:

```
from operations import *

import datetime
x = datetime.datetime.now()

print("*"*100)
print("\t\t\tHello and Welcome to Techno-Nepal Land Management System")
print("*"*100)

def main():
    while True:
        display_land_data()
        print("\nEnter '1' to rent a land")
        print("Enter '2' to return the land")
        print("Enter '3' to exit")
        choice = input("Enter the numbers to rent, return or exit: ")
        if choice == "1":
            rent_land()
            loop_()
        elif choice == "2":
            return_land()
            loop_return()
        elif choice == "3":
            exit()
            break
        else:
            print("-"*80)
            print("Invalid choice, Please enter the options from above.")
            print("-"*80)

if __name__ == "__main__":
    main()
```

2) Code of operation.py:

```

from read import read_info
from write import update_availability, generate_rent_invoice, generate_return_invoice

def display_land_data():
    lands = read_info("info.txt")
    print("\nLand Information:")
    print("{:<15} {:<15} {:<10} {:<15} {:<15}".format("Kitta Number",
    "City/District", "Direction", "Area (anna)", "Price (NPR)", "Availability"))
    for land in lands:
        kitta_number = land.get("Kitta Number", "N/A")
        city_district = land.get("City/District", "N/A")
        direction = land.get("Direction", "N/A")
        area = land.get("Area (anna)", "N/A")
        price = land.get("Price (NPR)", "N/A")
        availability = land.get("Availability", "N/A")
        print("{:<15} {:<15} {:<10} {:<15} {:<15}".format(kitta_number, city_district,
direction, area, price, availability))

def get_land_by_kitta_number(file_name, kitta_number):
    lands= read_info(file_name)
    for land in lands:
        if int(land.get("Kitta Number", "-1"))== kitta_number:
            return land
    return None

def rent_land():
    display_land_data()
    while True:
        try:
            kitta_number = int(input("\nEnter the Kitta Number of the land you want to
rent: "))
            if 201 <= kitta_number <= 215:
                break
            else:
                print("-"*80)
                print("\t\tError: Please enter a number between 201 and 215.")
                print("-"*80)
        except ValueError:
            print("-"*80)

```

```

        print("\t\tError: Invalid input. Please enter a valid integer.")
        print("-"*80)
while True:
    try:
        rented_duration = int(input("Enter the duration of land you want to rent (in
months): "))
        if rented_duration>3:
            break # break out of the loop if duration is valid
        else:
            print("\t\tError: Duration must be above 3 months")
    except Exception:
        print("\t\tPlease enter the duration in months only!!!")

customer_name = input("Enter your name: ")
land = get_land_by_kitta_number("info.txt", kittta_number)
if land and land.get("Availability", "N/A") == "Available":
    rented_lands = [land]
    generate_rent_invoice(customer_name, rented_lands, rented_duration)
    update_availability("info.txt", kittta_number, "Not Available")
    print("-"*100)
    print(f"\t\tLand with Kitta Number {kitta_number} has been rented successfully
for {rented_duration} months.")
    print("-"*100)
elif not land:
    print("-"*100)
    print("\t\tLand with the provided Kitta Number does not exist.")
    print("-"*100)
else:
    print("-"*100)
    print("\t\tThe land is currently not available for renting.")
    print("-"*100)

def loop_():
    print("Do you want to rent another land?")
    Continue = input("Enter 'y' to continue or 'n' for rental details: ")
    if Continue == "y":
        rent_land()
    elif Continue == "n":
        return
    else:
        print("+"*80)

```

```
print("\t\t\t Please provide value in 'y' or 'n' only!!")
print("+*80)
return loop_()

def return_land( ):
    display_land_data()
    while True:
        try:
            kitta_number = int(input("\nEnter the Kitta Number of the land you want to
return: "))
            if 201 <= kitta_number <= 215:
                break
            else:
                print("+"*100)
                print("\t\tError: Please enter the kitta number correctly which you have
rented.")
                print("+"*100)
        except ValueError:
            print("-"*100)
            print("\t\tError: Invalid input. Please enter a valid integer.")
            print("-"*100)

customer_name = input("Enter your name: ")
while True:
    try:
        rented_duration = int(input("Enter the duration of land you had taken for
renting: "))
        if rented_duration>3:
            break
        else:
            print("****100)
            print("\t\tError: Duration must be above 3 months")
            print("****100)
    except Exception:
        print("****100)
        print("\t\tPlease enter the duration in months only!!!")
        print("****100)

while True:
    try:
```

```

        return_duration = int(input("Enter the duration of the land you have returned:
"))
        if return_duration >3:
            break
        else:
            print("****100)
            print("\t\tError: Duration must be above 3 months")
            print("****100)
        except Exception:
            print("-"*100)
            print("\t\tPlease enter the duration in months only!!!")
            print("-"*100)
        land = get_land_by_kitta_number("info.txt", kittta_number)
        if land and land.get("Availability", "N/A") == "Not Available":
            fine_amount_per_month = float(land.get("Price (NPR)", "0"))*0.1
            if return_duration > rented_duration:
                months_late = return_duration - rented_duration
                total_fine = fine_amount_per_month * months_late
                print("****100)
                print(f"\t\tThe land was returned late by {months_late} months.")
                print(f"\t\tSo, fine of NPR {total_fine} was applied.")
                print("****100)
            else:
                total_fine = 0
                print("The land was returned on time or early. So, no fine was applied.")
            returned_lands = [land]
            generate_return_invoice(customer_name, returned_lands, fine_amount=0)
            update_availability("info.txt", kittta_number, "Available")
            print(f"Land with Kitta Number {kittta_number} has been returned successfully.")
        elif not land:
            print("-"*80)
            print("\t\tLand with the provided Kitta Number does not exist.")
            print("-"*80)
        else:
            print("-"*100)
            print("\t\tThe land is not currently rented.")
            print("-"*100)

def loop_return():
    print("Do you want to return another land?")
    continue_ = input("Enter 'y' or 'n' to continue: ")

```

```

if continue_ == "y":
    return return_land()
elif continue_ == "n":
    return
else:
    print("*" * 80)
    print("\t\t\t Please provide value in 'y' or 'n' only!!")
    print("*" * 80)
    return loop_return()

def exit():
    print()
    print("*" * 80)
    print("\t\t Thank you for using our Land management system")
    print("*" * 80)
    return exit

```

3) Code of write.py:

```

import datetime

def update_availability(file_name, kittta_number, status):
    lines = []
    with open(file_name, 'r') as file:
        headers = file.readline().strip().split(',')
        lines.append(', '.join(headers) + '\n')
        for line in file:
            land_data = line.strip().split(',')
            if int(land_data[0]) == kittta_number:
                land_data[-1] = status
                line = ', '.join(land_data) + '\n'
            lines.append(line)
    with open(file_name, 'w') as file:
        file.writelines(lines)

```

```
def generate_rent_invoice(customer_name, rented_lands, rented_duration):
```

```

total_amount = sum(float(land.get("Price (NPR)", "0")) for land in rented_lands) *
rented_duration
invoice_name =
f"{customer_name}_rent_invoice_{datetime.datetime.now().strftime('%Y%m%d%H%M%S')}.txt"

with open(invoice_name, 'w') as file:
    file.write("Rent Invoice\n")
    file.write(f"Customer Name: {customer_name}\n")
    file.write(f"Date and Time of Rent: {datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S')}\n")
    file.write("Rented Lands:\n")
    for land in rented_lands:
        file.write(f"Kitta Number: {land.get('Kitta Number', 'N/A')}, "
                  f"City/District: {land.get('City/District', 'N/A')}, "
                  f"Direction: {land.get('Direction', 'N/A')}, "
                  f"Area: {land.get('Area (anna)', 'N/A')} anna\n")
    file.write(f"Duration of Rent: {rented_duration} months\n")
    file.write(f"Total Amount: NPR {total_amount}\n")

print("\nRent Invoice")
print(f"Customer Name: {customer_name}")
print(f"Date and Time of Rent: {datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S')}")
print("Rented Lands:")
for land in rented_lands:
    print(f"Kitta Number: {land.get('Kitta Number', 'N/A')}, "
          f"City/District: {land.get('City/District', 'N/A')}, "
          f"Direction: {land.get('Direction', 'N/A')}, "
          f"Area: {land.get('Area (anna)', 'N/A')} anna")
print(f"Duration of Rent: {rented_duration} months")
print(f"Total Amount: NPR {total_amount}")
return total_amount

def generate_return_invoice(customer_name, returned_lands, fine_amount):
    invoice_name = f"{customer_name}_return_invoice_{datetime.datetime.now()}"
    .strftime('%Y%m%d%H%M%S')}.txt"
    with open(invoice_name, 'w') as file:
        file.write("Return Invoice\n")
        file.write(f"Customer Name: {customer_name}\n")
        file.write(f"Date and Time of Return: {datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S')}\n")

```

```

file.write("Returned Lands:\n")
for land in returned_lands:
    file.write(f"Kitta Number: {land.get('Kitta Number', 'N/A')}, "
               f"City/District: {land.get('City/District', 'N/A')}, "
               f"Direction: {land.get('Direction', 'N/A')}, "
               f"Area: {land.get('Area (anna)', 'N/A')} anna\n")
if fine_amount > 0:
    file.write(f"Fine Amount: NPR {fine_amount}\n")

print("\nReturn Invoice")
print(f"Customer Name: {customer_name}")
print(f"Date and Time of Return: {datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S')}")
print("Returned Lands:")
for land in returned_lands:
    print(f"Kitta Number: {land.get('Kitta Number', 'N/A')}, "
          f"City/District: {land.get('City/District', 'N/A')}, "
          f"Direction: {land.get('Direction', 'N/A')}, "
          f"Area: {land.get('Area (anna)', 'N/A')} anna")
if fine_amount > 0:
    print(f"Fine Amount: NPR {fine_amount}\n")

```

4) Code of read.py:

```

def read_info(file_name):
    lands = []
    with open(file_name, 'r') as file:
        headers = file.readline().strip().split(',')
        for line in file:
            land_data = line.strip().split(',')
            land = dict(zip(headers, land_data))
            lands.append(land)
    return lands

```