PROJECT REPORT OF AI

TOPIC: AI in agriculture (Livestock health monitoring)

TEACHER NAME: - ANKITA WADHAWAN

SUBJECT: - ARTIFICIAL INTELLIGENCE (INT404)

SECTION: - K21GP

PROJECT DONE BY:

Name	Reg. No.	Roll No.
Saikat Nandi	12104728	02
Aharsh Singh	12110186	26
Revelli Rishitha Prasanna	12113437	50

Content to be covered.

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1) Introduction

2) Different applications of AI in agriculture

3) Impact of AI in agriculture

4) Future Scope

5) Conclusion

PROJECT DESCRIPTION

OBJECTIVE

AI will help livestock farms accumulate and analyze data to accurately predict consumer behavior, like buying patterns, leading trends, etc.

AI solutions including, image classification with body condition score and feeding patterns and facial recognition for livestock, dairy farms can now individually monitor the behavioral aspects of animals. In addition to this, farmers are using machine vision, which aids them in recognizing facial features and hide patterns. Farmers are also able to monitor water and food intake of livestock and record their body temperature and behavior. It is because of such advantages of AI that its demand in the agricultural sector is increasing at a rapid pace.

ABSTRACT

Artificial intelligence is changing each and every field of the modern world and livestock is not any exception. It is greatly expected that this modern technology has the potential to

bring a breakthrough in the field of livestock through combining biological information with technological advancement. Modern farms with the implementation of AI techniques are showing exceptional growth as they have improved efficiency in terms of livestock production and minimized the physical labor as well as the labor cost. Thus this sector has become more significant in world GDP. The present study is intended to highlight the principal benefits provided by AI techniques including robots, drones, and 3D printing. Through this research, readers can get a better idea about applications of AI, its benefits and disadvantages in the field of dairy farming and livestock. It will also encourage fellow researchers to conduct such research in the future.

WORK DISTRIBUTION

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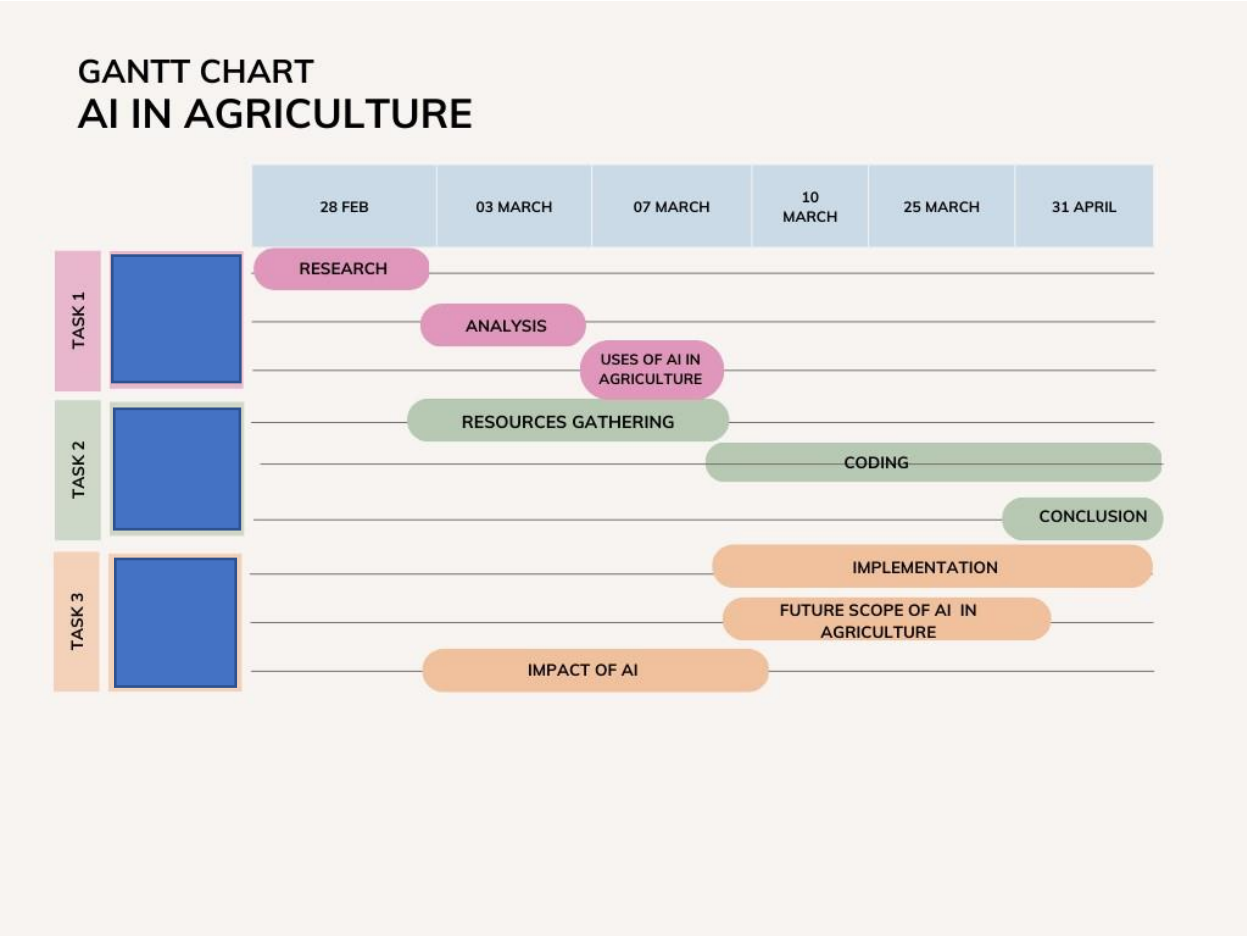
1. SAIKAT NANDI
    - About uses of AI in agriculture.
    - What are the applications of AI in agriculture.
    - What is the need of AI in agriculture field.

2. AHARSH SINGH
    - Impact of AI in agriculture.
    - What is the future scope and what can be the future technology that can boosts Livestock farming.
    - Coding of Program

3. REVELLI RISHITHA PRASANNA

- Resources gathering
- Software part and has given the conclusion in this project.

GANTT CHART



AI in agriculture

AI is also used to manage and keep an eye on animals. Farmers are able to monitor the health and behaviour of their animals in real-time by employing wearable technology and sensors. A health problem may be indicated by trends and abnormalities in the data, such as changes in appetite or activity levels.

For instance, producers can take action before the issue worsens and becomes more expensive by using AI algorithms to spot early indicators of lameness in cows. AI can also be used to optimise feed regimens and enhance animal health generally, increasing production and profitability.

applications of AI in agriculture

A computer vision-based livestock management system created by the Irish business Cainthus allows farmers to keep an eye on their cows. Results of the real-time camera feed analysis are sent to farmers' cell phones. For instance, smart cameras let farmers watch how their cows eat and make sure that the right amount of grain is given whenever it's needed.

Iceland has another AI-powered system for managing cattle that takes over remote control of the feeding, milking, and cleaning systems. That implies that cows have a say in when and how much of their food they eat. The health of the cows, their milk production, and even the number of vitamins in the milk that has been collected are all monitored by sensors.

Impact of AI in agriculture

The agriculture sector is being significantly impacted by artificial intelligence as it enables farmers to manage their operations more effectively, cut down on waste, and enhance yields. Farmers can analyse data in real time and make better decisions about everything from irrigation and fertilisation to pest control and harvesting by utilising machine learning algorithms and other AI technology.

Precision farming, crop monitoring, animal management, and weather forecasting are just a few of the many applications of artificial intelligence in agriculture. For instance, in precision farming, sensors and drones driven by AI are used to gather information on the temperature, moisture, and other environmental variables. This information is then used to optimise the timing of planting and harvesting.

applications of AI in agriculture

- **Artificial Intelligence for Health monitoring**

  The Intelligent Dairy Farm Assistant (IDA) is the product of combining AI and motion sensors, two cutting-edge technologies. A motion sensor attached to the cow's neck as part of the IDA system transmits information about the cow's movements. The AI programme receives movements of the cow from the motion-sensing device. The sensor information is saved and coordinated with the cow's actual behaviour. Once sufficient data has been gathered, the AI can ascertain the activity of the cow simply by reading the data. The AI is able to assess whether the cow is unwell, ready to breed, or has grown less productive using the most recent data from motion sensors and its comparison.

  Additionally, the AI notifies the farmer via alerts when the behaviour of the cow changes, enabling human intervention as necessary. It would be nearly difficult for the farmer to maintain a close eye on every cow in the herd without artificial intelligence (AI).

- **Robotic System to Deliver Vaccines**

Animals in dairy farms must now receive hundreds of vaccinations and reproductive medications from producers. Each dairy farm would have to make a significant investment in labour and training if vaccines were to be administered manually. Modern dairy farms employ a robotic injection system to provide vaccines and reproductive medications to domestic animals on the dairy farm in order to achieve 100% compliance rate and a viable economic future for dairy farms. A dairy automation system is connected with the robotic system. The robotic injection device scans the RFID tags that are connected to the cow's ear to obtain data on the cow's health and immunisation history. If the cow needs an injection, the injecting mechanism positions itself to focus the animal's attention to the injection site.

- ***Facial recognition***

Facial recognition is nothing new, but it is now being applied to domestic cattle as well as to humans. Even if "smart" cattle monitoring is becoming increasingly widespread, current systems still heavily rely on physical tracking equipment. The burden of installing these devices will be eliminated by facial recognition technology, making it simple to monitor an entire heard with no intervention. This is planned to allow for

individualised group behaviour monitoring, early lameness detection, and precise feeding habit recording.

Although AI has been heralded as the farming of the future, it is still unclear how much technology will alter the day-to-day activities of the conventional family farm. The "digital farm" of the future, however, might be closer than we realise thanks to emerging Agritech companies that are manufacturing increasingly affordable equipment.

Artificial intelligence in poultry

Digital technologies are advancing to keep up with the unrelenting growth of the poultry industry and can give producers a significant productivity edge.

Many other technologies now depend on AI technology as their foundation. AI is used by robots in the processing plant, for instance, to increase productivity. Automating processes like chicken deboning requires individual adaption and recognition of each chicken's form and size. For this application, artificial intelligence is the ideal technology.

Robots execute the tasks that AI directs them to undertake using a combination of technologies based on the information that sensors gather.

The environment of the home can be monitored and managed by artificial intelligence. Sensors gather the data, software keeps track of it, and AI modifies the house's settings or notifies the farmer if there is a possible problem, like a sick bird. The farmer's tablet or smartphone will subsequently receive all of this data.

FUTURE SCOPE

Because most cutting-edge technologies are only employed on large, well-connected farms, the future of AI in agriculture will need to place a strong emphasis on universal access. The future of machine learning automated agricultural goods and data science in farming will be secured by expanding access and connectivity to even tiny farms in distant regions throughout the world.

CODE OF APPLICATION

```cpp
#include <iostream>
#include <vector>
#include <string>
#include <ctime>
#include <cstdlib>

using namespace std;

// Structure for animal information
struct Animal {
    string id;
    string type;
    double weight;
    double temperature;
    bool isHealthy;
};

// Function to generate a random double number between min and max values
double randomDouble(double min, double max) {
    return (double) rand() / RAND_MAX * (max - min) + min;
```

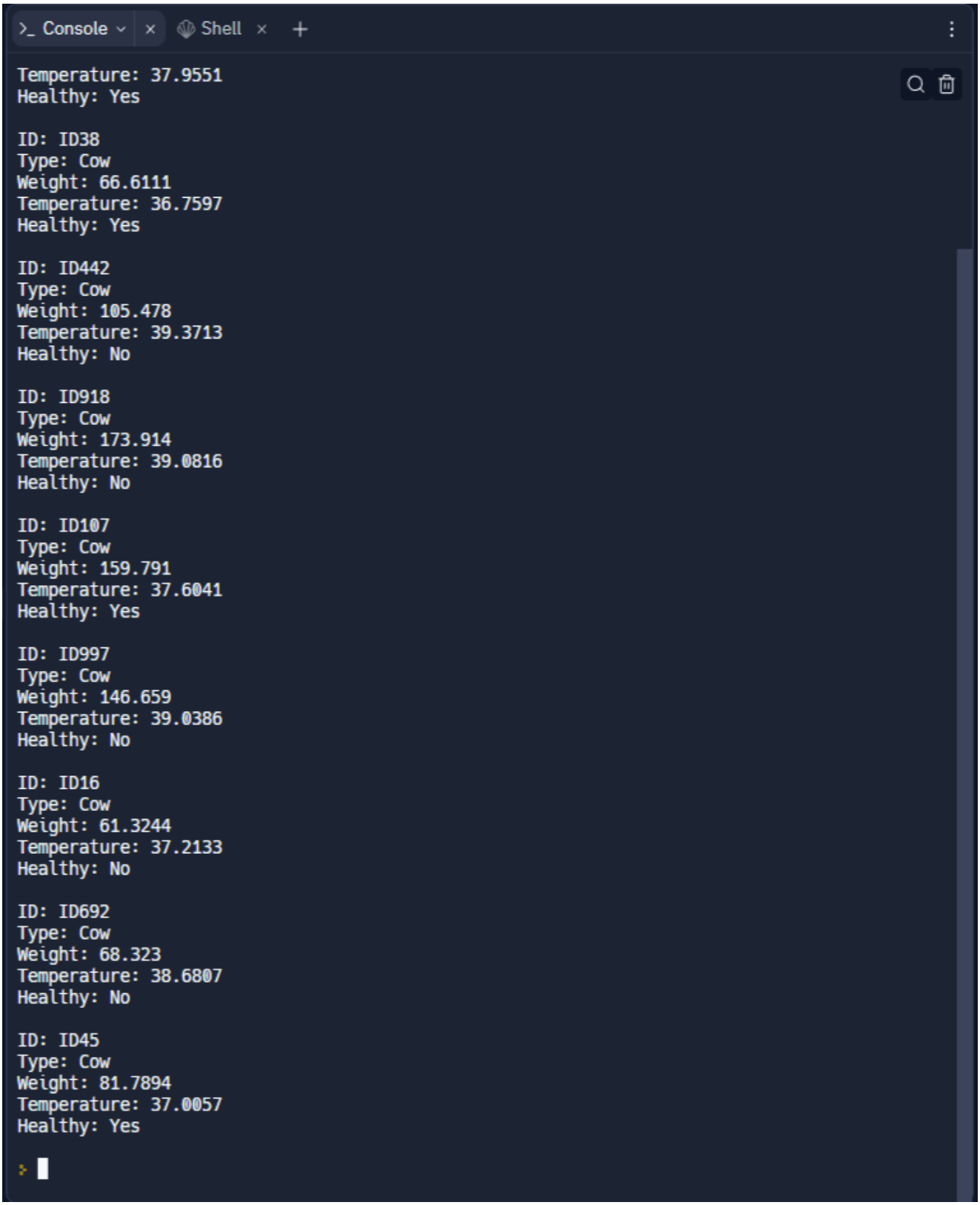
```cpp
}

// Function to generate a random boolean value
bool randomBool() {
    return rand() % 2 == 0;
}

// Function to generate a random animal
Animal generateAnimal(string type) {
    Animal animal;
    animal.id = "ID" + to_string(rand() % 1000); // Generate a random ID
    animal.type = type;
    animal.weight = randomDouble(50, 200); // Generate a random weight
    animal.temperature = randomDouble(36.5, 39.5); // Generate a random temperature
    animal.isHealthy = randomBool(); // Generate a random health status
    return animal;
}

// Function to print an animal
void printAnimal(Animal animal) {
    cout << "ID: " << animal.id << endl;
    cout << "Type: " << animal.type << endl;
    cout << "Weight: " << animal.weight << endl;
    cout << "Temperature: " << animal.temperature << endl;
    cout << "Healthy: " << (animal.isHealthy ? "Yes" : "No") << endl;
    cout << endl;
}

// Main function
int main() {
    // Initialize the random seed
    srand(time(NULL));

    // Generate 10 random animals
    vector<Animal> animals;
    for (int i = 0; i < 10; i++) {
        animals.push_back(generateAnimal("Cow"));
    }

    // Print the generated animals
    for (Animal animal : animals) {
        printAnimal(animal);
    }
```

```
    return 0;
}
```

In this example, we have defined a struct called Animal to store the information about each animal, including its ID, type, weight, temperature, and health status. We have also defined several helper functions, including randomDouble and randomBool to generate random double and boolean values, and generateAnimal and printAnimal to generate and print the animal information, respectively.

In the main function, we first initialize the random seed using the srand function and the current time. We then generate 10 random cows using the generateAnimal function and store them in a vector called animals. Finally, we print the information about each cow using the printAnimal function.

OUTPUT


Console
Shell
Temperature: 37.9551
Healthy: Yes
ID: ID38
Type: Cow
Weight: 66.6111
Temperature: 36.7597
Healthy: Yes
ID: ID442
Type: Cow
Weight: 105.478
Temperature: 39.3713
Healthy: No
ID: ID918
Type: Cow
Weight: 173.914
Temperature: 39.0816
Healthy: No
ID: ID107
Type: Cow
Weight: 159.791
Temperature: 37.6041
Healthy: Yes
ID: ID997
Type: Cow
Weight: 146.659
Temperature: 39.0386
Healthy: No
ID: ID16
Type: Cow
Weight: 61.3244
Temperature: 37.2133
Healthy: No
ID: ID692
Type: Cow
Weight: 68.323
Temperature: 38.6807
Healthy: No
ID: ID45
Type: Cow
Weight: 81.7894
Temperature: 37.0057
Healthy: Yes

CODE OF 2nd APPLICATION

```
#include <iostream>
#include <chrono>
#include <thread>
#include <cmath>

using namespace std;

// Constants
const double MIN_TEMPERATURE = 10.0; // Minimum temperature value
const double MAX_TEMPERATURE = 40.0; // Maximum temperature value
const double MIN_HUMIDITY = 0.0; // Minimum humidity value
const double MAX_HUMIDITY = 100.0; // Maximum humidity value
const double MIN_AMMONIA = 0.0; // Minimum ammonia value
const double MAX_AMMONIA = 10.0; // Maximum ammonia value
const double MIN_SANITATION_LEVEL = 0.0; // Minimum sanitation level value
const double MAX_SANITATION_LEVEL = 100.0; // Maximum sanitation level value
const double SANITATION_THRESHOLD = 80.0; // Sanitation threshold value
const double MIN_OUTPUT = 0.0; // Minimum output value
const double MAX_OUTPUT = 100.0; // Maximum output value

// Function to read the current temperature
double readTemperature() {
    // This is a placeholder function that returns a random temperature value between
MIN_TEMPERATURE and MAX_TEMPERATURE
    return (double) rand() / RAND_MAX * (MAX_TEMPERATURE - MIN_TEMPERATURE) +
MIN_TEMPERATURE;
}

// Function to read the current humidity
double readHumidity() {
    // This is a placeholder function that returns a random humidity value between
MIN_HUMIDITY and MAX_HUMIDITY
    return (double) rand() / RAND_MAX * (MAX_HUMIDITY - MIN_HUMIDITY) + MIN_HUMIDITY;
}

// Function to read the current ammonia level
double readAmmoniaLevel() {
```

```
    // This is a placeholder function that returns a random ammonia level value
between MIN_AMMONIA and MAX_AMMONIA
    return (double) rand() / RAND_MAX * (MAX_AMMONIA - MIN_AMMONIA) + MIN_AMMONIA;
}

// Function to write the output value to the sanitation system
void writeOutput(double output) {
    // This is a placeholder function that prints the output value to the console
    cout << "Output: " << output << endl;
}

// Main function
int main() {
    // Initialize the random seed
    srand(time(NULL));

    // Initialize the variables
    double temperature = 0.0;
    double humidity = 0.0;
    double ammoniaLevel = 0.0;
    double sanitationLevel = 0.0;
    double output = 0.0;

    // Loop forever
    while (true) {
        // Read the current temperature, humidity, and ammonia level
        temperature = readTemperature();
        humidity = readHumidity();
        ammoniaLevel = readAmmoniaLevel();

        // Calculate the sanitation level
        sanitationLevel = 100.0 - (humidity + ammoniaLevel) / 2.0;

        // Calculate the output value based on the sanitation level
        if (sanitationLevel < SANITATION_THRESHOLD) {
            output = MAX_OUTPUT;
        } else {
            output = MIN_OUTPUT;
        }

        // Limit the output value between MIN_OUTPUT and MAX_OUTPUT
        output = max(output, MIN_OUTPUT);
        output = min(output, MAX_OUTPUT);
```

```
    // Write the output value to the sanitation system
    writeOutput(output);

    // Sleep for 1 second
```

This program is for the poultry farming in which the various thing like temperature, humidity, ammonia,
and sanitation level can be checked and maintained.

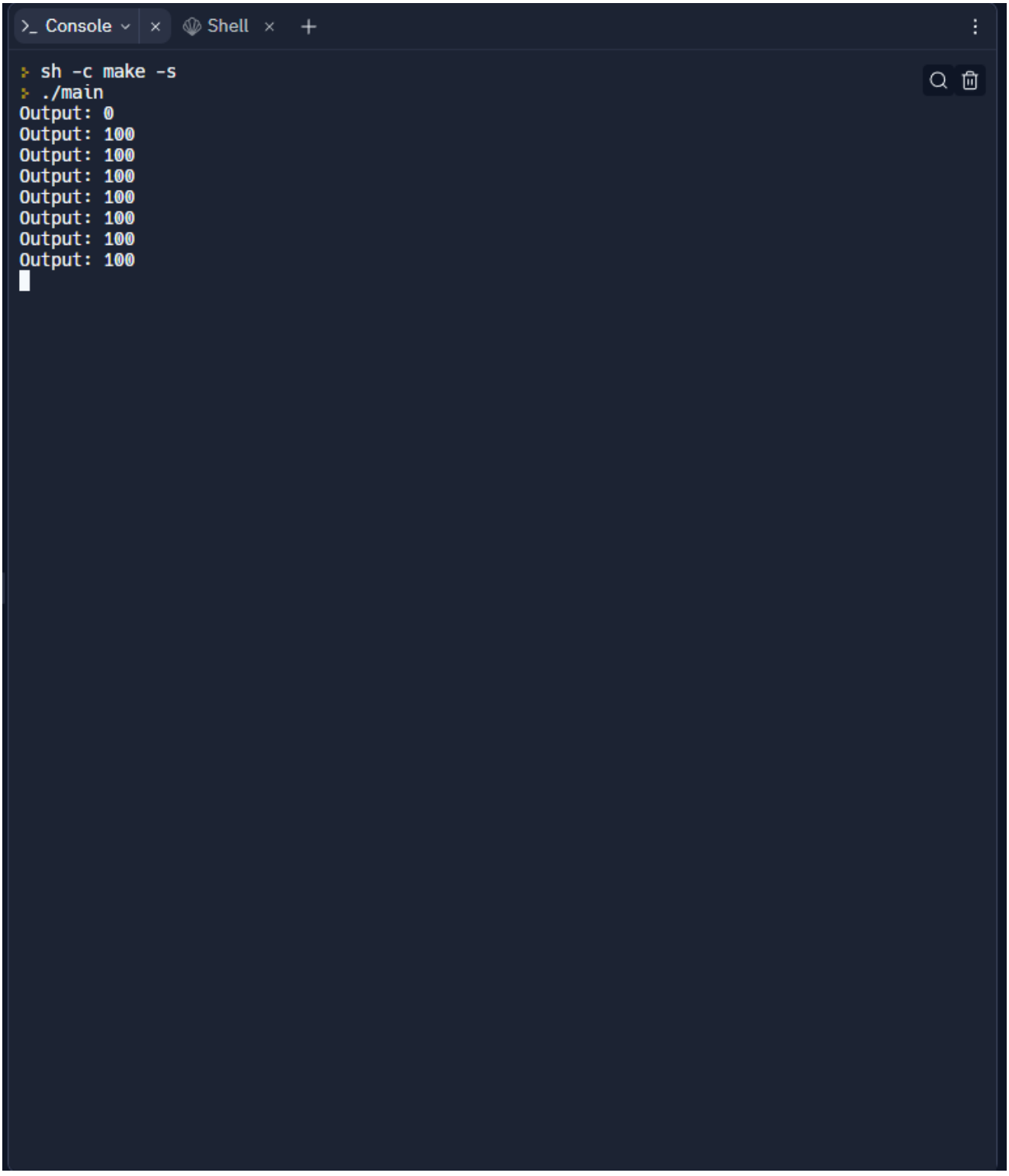
CONCLUSION

Though artificial intelligence is not yet widely used in the food industry or in customers' daily lives, this technology's adoption could change the entire food-processing chain in the future. Despite its immense benefits, it is nevertheless vital to proceed cautiously because widespread use can result in data security breaches and safety issues with AI.

Safety procedures and data protection measures should come along when these diverse developments are gradually used. The food business as we know it is certain to be disrupted and changed by AI due to its untapped potential, but for the better.

If your organisation is considering implementing AI technologies to boost business performance and better the food sector as a whole, present your idea to an expert in the field.

OUTPUT


Console
Shell
sh -c make -s
./main
Output: 0
Output: 100
Output: 100
Output: 100
Output: 100
Output: 100
Output: 100
Output: 100