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EcoLlama

ECOLlama ver 1.0 is an open source ecological adaptation project developed to combat climate change in the Mediterranean Region. The project aims to analyse and optimise impacts on agricultural activities in the region using Meta's LLaMA 3 artificial intelligence model. It supports the development of sustainable agriculture and water resources management strategies by providing solutions in areas such as artificial intelligence, data analysis, forecasting, early warning systems and resource management.

ECOLlama Ver 1.0 : Open Source Ecological Adaptation Project to Combat Climate Change

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Summary

In the last 50 years, the Mediterranean regions of Turkey have been subjected to severe impacts of climate change. Rising temperatures, changing precipitation patterns and frequent extreme weather events have negatively affected ecosystems, agriculture and the local economy. For example, the drought of 2023 led to a 40 per cent reduction in water resources in the region, severely disrupting agricultural production.

International organisations such as the European Union (EU) and the United Nations (UN) have taken important steps to combat climate change in recent years. The EU has implemented the Green Deal, which aims to reduce carbon emissions by 55% by 2030, while the UN is promoting global climate action under the Sustainable Development Goals. These organisations have developed various strategies to mitigate the devastating effects of climate change, such as increasing the use of renewable energy sources, improving energy efficiency and reducing carbon emissions.

The dangers of climate change are not only environmental but also socio-economic and health risks. At this point, the ECOLlama ver 1.0 project comes into play. ECOLlama ver 1.0, an open source ecological adaptation project that aims to increase resistance and adaptation to these changes, aims to increase efficiency and sustainability in agricultural activities by using Meta's open source LLaMA 3 artificial intelligence model.

By utilising the deep learning and natural language processing capabilities of LLaMA 3 for the analysis, prediction and management of climate data, strategies suitable for local climate conditions will be developed. This project aims to make significant contributions to sustainable agriculture and water resources management by addressing socioeconomic and environmental impacts while providing innovative solutions to combat climate change. Within the scope of the project, the concept will be concretised and its applicability will be tested through pilot region applications.

Mediterranean Region and Turkey:

The fact that the economic structures of developing countries are based on agricultural production causes these countries to be more deeply and directly affected by climate change. Especially extreme weather conditions cause mass migration in these regions by making agricultural production difficult or even impossible. According to United Nations estimates, more than 500 million people have been displaced worldwide due to climate change. Despite significant advances in pesticide, fertiliser and irrigation systems in the agricultural sector, climatic conditions still play a decisive role in production.

The agriculture sector is one of the most vulnerable sectors to climate change. Climate change both affects agriculture and agricultural activities contribute to climate change. Agricultural activities in tropical and subtropical regions are adversely affected by unusual floods and droughts, while in temperate regions, an extended growing season can lead to an increase in agricultural production. In arid regions, on the other hand, desertification caused by increasing temperatures leads to a decrease or even extinction of agricultural production. The impacts of climate change on agriculture are manifested in food security, development and international trade. The decrease in the amount of production leads to inflation by increasing agricultural prices, an increase in the current account deficit as a result of meeting the supply deficit in agricultural products through imports, a decrease in employment in the agricultural sector and the compensation of losses of producers by governments have a negative impact on the budget. The agricultural and economic impacts of climate change depend on the rate and severity of climate change and the ability of agricultural production to adapt to these changing conditions. Impacts on agricultural yields are caused by factors such as temperature, precipitation, CO_2 content in the atmosphere, frequency of extreme events and sea level rises (Bayraç, Doğan 2016).

The Mediterranean region plays an important role in agricultural production with its geographical location and climate characteristics. However, increasing temperature and irregular rainfall in recent years have serious impacts on agricultural activities in the region (UNEP, 2022). Especially drought periods threaten the sustainability of irrigation systems and negatively affect agricultural productivity.

Turkey is located in a geography where the Mediterranean climate shows diversity. Especially in the Mediterranean region, important agricultural products such as olives and citrus fruits are grown. However, climate change deeply affects the agricultural sector by changing the growing conditions of these products (IPCC, 2021).

In the last 50 years, climate change in the Mediterranean region of Turkey has been clearly observed. During this period, significant changes such as temperature increases, changes in precipitation regime and prolonged drought periods have been experienced. There has been a noticeable increase in average temperatures, especially in the summer months, and at the same time, irregularities in the amount of precipitation have been observed in the winter months (TUIK, 2023).

Turkey is in the high risk group in terms of the impacts of global warming. Climate changes are expected to have serious negative impacts on agricultural activities, animal and plant habitats and water resources. Increased accumulation of greenhouse gases in the atmosphere will exacerbate water resources problems in arid and semi-arid regions of Turkey in the future and increase agricultural and drinking water needs. This situation will lead to the expansion of arid and semi-arid areas, increase in the duration and severity of summer droughts, and thus increase the rate of desertification, salination and erosion. The negative impact of drought on agricultural production and producers will lead to producers having to adapt their crops to new seasonal conditions. Therefore, it is of great importance to develop and support agricultural plant varieties suitable for warmer and drier climatic conditions in Turkey.

Climate changes have led to an increased need for irrigation in agricultural areas, imbalances in local ecosystems and difficulties in the management of water resources. In addition, there have been impacts on agricultural product diversity, and some traditional plant species have been replaced by species that are more suitable for climatic conditions. These species sometimes have a negative impact on the habitat in the region, affecting animal and plant populations.

Today, the negative impacts of climate change are increasing in the Mediterranean region of Turkey. Due to high temperatures and low rainfall, water resources are decreasing and agricultural productivity is decreasing. This situation directly affects local economies and communities and threatens the sustainability of agricultural enterprises (FAO, 2022).

Socioeconomically, problems such as decrease in agricultural incomes, increase in unemployment and migration movements arise. Socially, loss of agriculture-related cultural heritage and decline in the quality of life of local communities are observed. In natural habitats, the risk of species migration or extinction increases (WWF, 2023).

Temperature increases threaten the tourism sector and the sustainability of natural resources. This can negatively affect employment and dependence on local economies (FAO, 2023).

In the future, the impacts of climate change in the Mediterranean region are expected to become more severe. These include more frequent and intense periods of drought, greater stress on water resources, severe declines in agricultural production and deepening imbalances in ecosystems. This poses a serious threat to the future of the region's biodiversity, economy and social structure (IPCC, 2021).

Urgent and effective steps need to be taken on these issues for a sustainable future. Many measures and practices are being implemented worldwide within the scope of combating climate change. These practices include studies in various fields such as promoting renewable energy sources, increasing energy efficiency, and reducing greenhouse gas emissions. In addition, smart agricultural practices are being developed to reduce the risk of agriculture being affected by climate change and strategies are being developed for the sustainable management of water resources. In addition to these efforts, it is also important to protect natural habitats and support biodiversity. These various practices at the global level contribute to the adoption of a multifaceted and integrated approach in combating climate change. In terms of adaptation measures, strategies such as strengthening infrastructures to adapt to environmental changes, promoting the efficient use of water resources and being prepared for natural disaster risks stand out (IPCC, 2014).

The Use of New Technologies within the Scope of Combating Climate Change and Adaptation to Climate Change: Llama3 Example

Today, with developing technologies, we have new and powerful tools to combat climate change. Artificial intelligence (AI) technologies play an important role in this struggle, offering innovative solutions to understand, predict and take measures against the impacts of climate change.

AI technology has great potential to analyse and model climate data and make predictions. In particular, AI-based systems in combating climate change provide important information to decision makers by enabling fast and accurate processing of environmental data. These systems are used to determine the possible impacts of climate change, assess risks and develop appropriate strategies.

Meta's open source LLaMA 3 model is thought to be a good pillar of this challenge. LLaMA 3 offers high processing capacity and learning capabilities thanks to its version trained with 70 billion parameters.

When retrained with region-specific data and integrated into an external focal mechanism, the computational capabilities of LLaMA 3 will enable the establishment of a holistic and dynamic system to combat climate change.

LLaMA 3 can effectively process and analyse complex climate data with its powerful algorithms in deep learning and natural language processing. Thanks to these features, it has the ability to predict future climate changes over large amounts of data and develop strategic recommendations based on these predictions. Especially in areas such as agricultural production and water resources management in regions such as the Mediterranean Region and Turkey, the analyses provided by LLaMA 3 can support decision-making processes by providing important data to farmers and local governments.

LLaMA 3's processing capacity can be strengthened with API integrations and instant data tracking to support real-time data analyses and rapid decision-making processes. In this way, accurate irrigation schedules and agricultural production strategies can be determined based on continuously updated climate data.

LLaMA 3 can function as an important tool in making sense of complex climate data and decision-making processes. It can contribute to the development of strategic approaches based on scientific data, especially in line with the goals of maintaining ecosystem health and managing socioeconomic impacts. In this context, the analytical capacity offered by LLaMA 3 in the management of climate change in the Mediterranean Region and Turkey can help to effectively formulate sustainable agriculture and water resources management strategies.

By generating new and up-to-date data in such a system, it will be possible to continuously provide information to decision makers, make risk assessments and develop strategic plans.

A holistic and dynamic artificial intelligence system will be a powerful tool for monitoring and analysing the change processes in the region and developing new strategies. Thus, we can produce more effective and sustainable solutions in the fight against climate change.

Advantages of LLaMA 3 Artificial Intelligence Model in Combating Climate Change

The LLaMA 3 artificial intelligence model offers various advantages as a powerful tool in combating climate change. These advantages make it possible to produce innovative and effective solutions in important areas such as data analysis, forecasting, early warning systems, resource management, policy development and social awareness.

Data Analysis and Modelling

LLaMA 3 has a strong capacity to make sense of complex climate data by analysing large data sets. By processing data on climate change, it can identify past and current trends and model possible future scenarios. In this way, scientists and decision makers can better understand the impacts of climate change and develop appropriate strategies.

Forecasting and Early Warning Systems

LLaMA 3 can be used to predict climate events and detect potential risks in advance. In particular, predicting extreme weather events, droughts, floods and other climate-related disasters has great potential for building early warning systems. In this way, societies and the agricultural sector can be prepared for such events and minimise negative impacts.

Resource Management

Assessing the impacts of climate change on water resources and agricultural areas and developing strategies for the effective management of these resources is an important advantage of LLaMA 3. The model can support the sustainable use of water resources, optimisation of irrigation systems and strategic planning necessary to increase agricultural productivity.

Policy Development
LLaMA 3 can contribute to the development of policies based on scientific data. By analysing climate data, it provides accurate and reliable information to decision makers. This information can be used in the formulation of measures and policies to be taken within the scope of combating climate change. Thus, more effective and sustainable solutions can be developed.

Social Awareness
Creating and raising public awareness on climate change is another important advantage of LLaMA 3. By presenting climate data and analysis results in an understandable way, the model can inform the society and increase the participation of the society in the fight against climate change. In this way, individuals and communities can make more informed decisions regarding climate change.

Region Specific Solutions
When LLaMA 3 is retrained with region-specific data, it can produce solutions that are suitable for local climatic conditions and agricultural needs. A model trained with data for the Mediterranean region of Turkey can optimise strategies to combat climate change in this region. For example, it can make specific recommendations on agricultural products, irrigation systems and other agricultural practices suitable for the region.

Dynamic and Holistic System
As a dynamic and holistic artificial intelligence system, LLaMA 3 can work with continuously updated data. In this way, it can monitor the effects of climate change in real time and quickly adapt to changing conditions. This feature provides flexibility in combating climate change by providing decision makers with up-to-date and accurate information.

Efficiency and Cost Effectiveness
LLaMA 3 aims to reduce costs while increasing agricultural productivity. Accurate and effective processing of data maximises productivity in agricultural production and ensures efficient use of resources. This supports the sustainability of agricultural enterprises and helps them to have a stronger economic structure.

The advantages that the LLaMA 3 artificial intelligence model can provide in combating climate change show how powerful and effective a tool this technology is. The innovative solutions it offers in areas such as data analysis, forecasting, early warning systems, resource management, policy development and social awareness make a great contribution to the fight against climate change.

Restructuring the LLaMA 3 Model to Increase Resilience and Adaptation to Climate Change: EcoLlama Project
ECOLlama is an open-source climate and smart agriculture project developed by Turkey-based 'What If The Mind' artificial intelligence technologies company and supported by a consortium. ECOLlama, an LLaMA-based artificial intelligence technology that is planned to be accessible to everyone, is currently working on a non-profit basis. This technology aims to provide solutions to climate problems by combining the Internet of Things (IoT) and artificial intelligence, and to make these solutions open and transparent access so that everyone can benefit from them.

What If The Mind aims to increase resilience and adaptation to global challenges such as climate change through ECOLlama. This LLaMA-based technology aims to develop strategies suitable for local climate conditions by utilising deep learning and natural language processing capabilities for the analysis, prediction and management of climate data. In this way, innovative solutions will be offered to increase productivity in agricultural activities, manage water resources more effectively and ensure sustainability.

Furthermore, the open-source nature of ECOLlama aims to encourage collaboration between scientists, researchers and developers and to further advance this technology. Thus, everyone will be able to benefit from this technology and more effective steps will be taken to combat climate change.

Technical Planning
System Architecture and Process

Component	Function
Climate Data Provider APIs	Provide dynamic climate data
Regional Sensors	Verify data diversity, currency, and accuracy
Attention Mechanism Software	Process data and transfer it to LLaMA 3
LLaMA 3 Model	AI model fine-tuned with region-specific data
Server	Process data and calculate compliance values
Compliance Value Calculation	Determine and report the compliance value of data

This system starts with the collection of data from climate data provider APIs and regional sensors. APIs include sources such as the Meteorological API, Copernicus Climate Change Service (C3S), NASA Climate Data API, NOAA API, World Bank Climate Data API, OpenWeather API and WeatherStack API. Regional sensors consist of various devices such as soil moisture sensors, air temperature sensors, precipitation meters, solar radiation meters, and wind speed and direction sensors.

Data from APIs and sensors are collected and processed in the focal mechanism layer. The focus mechanism is a software layer that helps to select the most suitable conditions among the provided data. Thanks to the categorisation provided by this layer, cleaner data is provided to the Llama3 model trained by fine-tuning with regional data. The aim here is to optimise performance by creating a filter structure in the data coming to the Llama3 model.

The focus mechanism works with a matching parameter related to the state of the available data towards the requested action. This parameter has a threshold value that works with a sigmoid function. These thresholds verify the match rate of the categorised information and initiate the evaluation protocol.

At the end of this process, the processed data is transferred to the fine-tuned LLaMA 3 model. LLaMA 3, as a model trained with a much wider range of region-specific data, sets a comparison and agreement threshold on the training data with the current data transferred to it from the focal mechanism. The model works on a wide range of data such as current climate data and climate change data, the rate of climate change and which climate type it tends to shift towards, the list of agricultural products most compatible with this climatic transition phase and the rate of elimination, the suitability of soil structure and irrigation systems, and what the optimisation conditions are. The information obtained is continuously updated, creating a dynamic workflow. LLaMA 3 is tuned to work on a comprehensive dataset for the region and to take action in accordance with the data coming from the focal mechanism. The model is reconstructed with data collected from specific farms, woodlands, villages and settlements. These data were obtained from manual surveys, sensors and other digital sources and processed with historical benchmarks. LLaMA 3, together with other modules added to the model, is capable of generating binary codes against various data matches (see: Internet of Things compatibility topic).

As a result of all these processes, the focal mechanism with LLaMA 3 continues to exchange various data, updates the existing data on the most compatible options for agricultural studies and decides on road maps. This reporting process, which is optimised to maximise efficiency and reduce costs, will also generate a lot of additional data on how the region is changing and will have the ability to provide data to thousands of public institutions, academia and related organisations outside this field. Technically, processing the results on the server and calculating a concordance value is very important for the categorisation of data diversity. If this compliance value is below or above a certain threshold, a deficiency report and reasons are published. If the harmonisation value is appropriate, the data are forwarded to LLaMA 3, where a report and plan on conformity are created. The compliance report contains a comprehensive information package and action plan, including the most appropriate values for the region. These assessments are obtained through many relational issues such as irrigation, rainfall, underground resources, insolation process and climate structure. In addition, the model has the ability to mobilise smart agricultural systems developed with IOT systems.

Features

1. Data Collection and Validation:
Data from APIs and sensors are collected.

The accuracy of API data is verified based on sensor data.

2. Focus Mechanism:
Focuses on the alignment of the planned work with the current situation in the region and performs categorisation.

Processed data is transferred to the LLaMA 3 model.

3. LLaMA 3 Model:
It compares agricultural needs and current data with a fine-tuned version with region-specific data.

Reconstructed with data collected from farms, woodlands, villages and settlements.

4. Results Processing and Reporting:
The focus mechanism is capable of generating binary codes against data matches.

The match value is calculated and if it is below or above the threshold value, a failure report is issued.

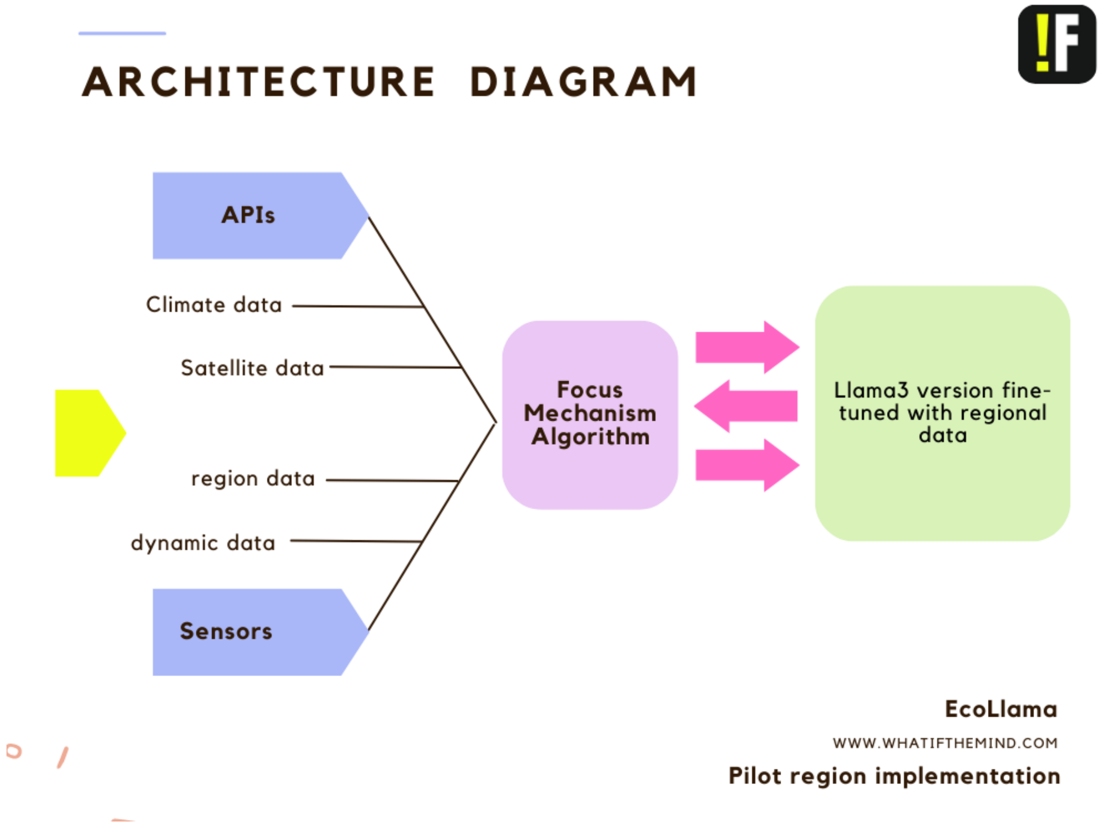
If the match value is appropriate, data is transmitted to LLaMA 3 and a compliance report is generated.

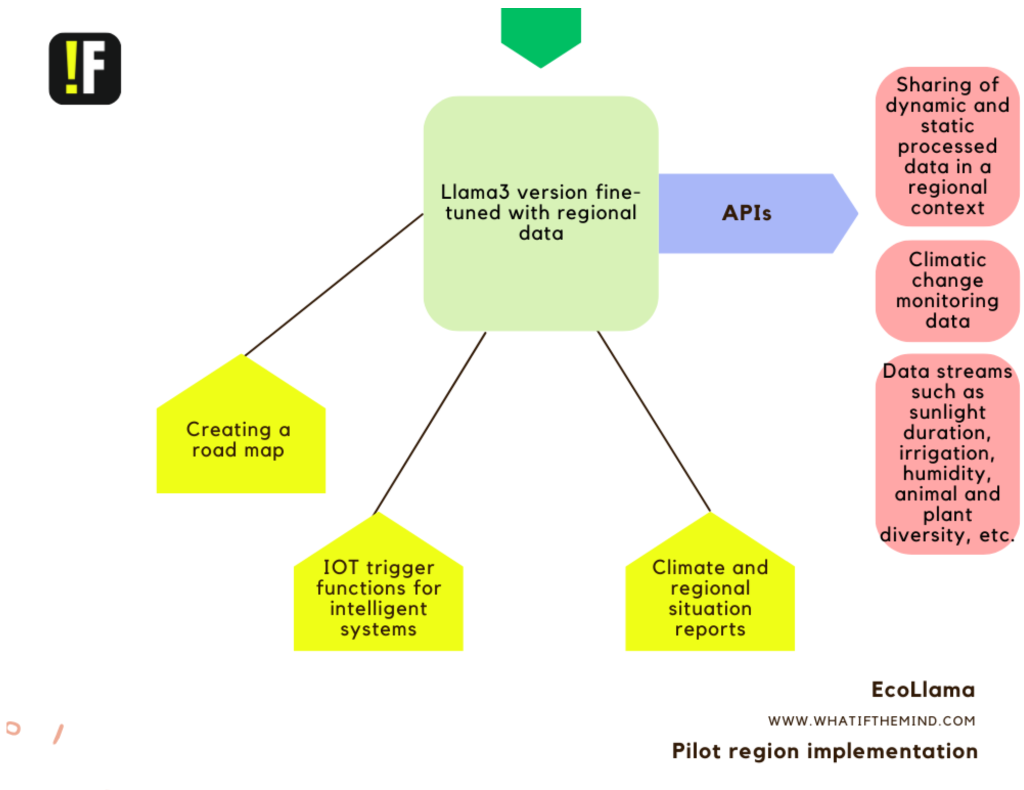
Synchronisation capability with intelligent systems (IOT), data and trigger signal transfers

5. Suitability Report:
It contains a comprehensive information package and action plan including the most appropriate values for the region.

This system ensures accurate and effective processing of agricultural data and provides solutions in line with regional needs.

Architecture Diagram





In this project, Llama3 is a decision and processing mechanism. Side modules are configured to optimise the decision processes and aim to maximise the system performance.

Retraining LLaMA 3 by Fine Tuning in the Light of Regional Data

1. Artificial Neural Network Structure of LLaMA 3

LLaMA 3 is a language model based on the Transformer architecture. Transformer is an artificial neural network architecture developed specifically to ensure high success in language processing tasks. LLaMA 3 has the following main components:

- Encoder and Decoder: Transformer architecture usually has an encoder and decoder component. However, LLaMA 3 is a decoder-only model and this structure is particularly effective in language modelling tasks.

- Multi-Head Self-Attention: This mechanism allows the model to consider the context of each word from multiple perspectives. Each head learns different features of the word and helps to understand contextual relationships.

- Feed-Forward Layers: These layers, which follow each self-attention layer, increase the learning capacity of the model and enable more complex features to be learnt.

- Positional Encoding: When working on sequential data in the Transformer architecture, positional encoding is used to understand the sequential context of words. These encodings ensure that the model is sensitive to sequential information.

2. Configuring the Data to be Fine-Tuned

Fine-tuning based on regional data allows the model to be tailored to the language and context of a specific geographical region. This process usually involves the following steps:

- Data Collection and Preprocessing: The first step is the collection of regional data. This data may include textual data, local language usage, cultural references and information about local events. The collected data is cleaned and structured in terms of language and context. In this process, redundant information is extracted and the data is converted into the appropriate format for the model to learn.

- Data Labelling and Categorisation: Labelling regional data helps the model to learn what kind of answers to give in which contexts. The data is categorised into categories such as regional language use, topics and contextual factors.

- Data Representation: The data needs to be transformed in accordance with the LLaMA 3 model. This means tokenisation and vectorisation of texts and making them suitable for the input format of the model. Tokenization allows the texts to be divided into parts that the model can understand.

3. Fine Tuning Process

The fine-tuning process involves re-adapting the pre-trained generic model of LLaMA 3 to the regional data. This process includes the following steps:

- Pre-Training: LLaMA 3 is pre-trained on a large dataset for general language tasks. This training allows the model to learn the basic rules and structure of the language.

- Preparation of Fine-Tuning Training Data: To fine-tune according to regional data, this data is integrated into the pre-trained parameters of the model. This step allows the model to learn regional language features.

- Training the Model with Fine Tuning: During the fine-tuning process, the information learnt during the overall training of the model is retained, but it is retrained with regional data. This process helps the model to understand regional contexts and language features. Tuning hyperparameters during training is critical to optimise the model's performance on regional data.

- Evaluation and Testing: Once fine-tuning is complete, the performance of the model is evaluated. This is done to check how well the model understands the regional language and context and whether it gives appropriate answers. In the testing phase, the outputs of the model will be evaluated in real-world scenarios and further fine-tuning will be done if necessary.

Llama3 and Focus Mechanism Integration and Reason for Additional Focus Mechanism

Attention mechanism algorithms are used to select and process important parts of data, especially in deep learning and artificial intelligence models. However, in the EcoLlama project, there is a pioneering focus mechanism in addition to Llama3. The main reasons for this are related to specific optimisations for categorising the alignment of agricultural activities with climate APIs and data from sensors;

- Feature Selection: The attention mechanism can determine which parts of the data are more important for the model. In this way, a model like LLaMA 3 is trained only with meaningful and relevant data. Some of the fine-tuned special data sets applied to the Llama3 model are prepared according to a special IOT format and prepared to convert trigger inputs into outputs. Therefore, it is essential that the data coming into Llama3 is at the optimum scale in order to optimise the system for large-scale transactions and reduce costs.

- Noise Reduction: Attention mechanisms improve the learning process of the model by reducing data noise and irrelevant information.

- Customised Attention Weights: By using customised attention weights for different tasks, it can enable the model to perform better on certain tasks.

- Preprocessing and Adaptation: The attention mechanism can help to adapt the data to data in a particular format or structure. This is important for LLaMA 3 to process data more effectively.

- Low Information Density: Working with more customised and important data allows the model to be faster and more efficient in the training and inference process.

- Improved Resource Utilisation: Especially when working with large datasets and models, the attention mechanism can optimise resource usage by reducing the amount of data.

- Better Representation Capability: Focusing more on the important parts of the data allows the model to have better representation ability.

- Understanding Context: Better understanding the context and relationships of the data enables the model to produce more accurate and meaningful outputs.

- Filtering Erroneous Data: It can detect and filter erroneous or incorrect data that the model may encounter.

- Dealing with Anomalies: Attention mechanisms can be used to deal with anomalies and make the model perform better in such situations.

Ultimately, the importance of passing data through an attention mechanism stems from its potential to improve the performance and efficiency of the model. This is a critical step, especially when working with large and complex datasets.

Internet of Things Compatibility (IoT)
In the project architecture, smart agricultural systems are designed by integrating with IoT (Internet of Things) technologies. The aim here is to create a module that will lead to the use of the processed data produced by Llama3 as a decision mechanism in the automation system. The outputs of advanced AI models such as LLaMA 3 can play an important role in these systems. For example, when planning for irrigation systems, LLaMA 3's climate predictions and analyses can be used to ensure more efficient use of water.

The integration process may include the following steps:
1. API Integration: The prediction and analysis data provided by LLaMA 3 can be integrated with IoT platforms via APIs. APIs enable this data to be transmitted directly to IoT devices and convert the data from Llama3 into a format that IoT devices can perceive.

2. Irrigation and Other Trigger Systems: By synchronising IoT-based irrigation and other triggering systems with EcoLLLaMA's analytical capabilities, the amount and timing of operations can be adjusted automatically. In this way, it may be possible to use water more efficiently and optimise plant growth in agricultural lands.

3. Data Analysis and Decision Support: The real-time data analytics provided by LLaMA 3 can help agronomists or farmers make the right decisions. For example, when an upcoming weather event is predicted, it may be possible to automatically adjust irrigation systems through IoT sensors.

4. Energy Efficiency: LLaMA 3's energy consumption predictions can also be integrated into IoT-based agricultural equipment. In this way, operating costs can be reduced by optimising energy consumption.

These integrations can be an important step to increase agricultural productivity and support sustainable agricultural practices. The combination of technologies such as IoT and LLaMA 3 can contribute to making agricultural processes smarter and more efficient.

Thanks to this process, a strong artificial intelligence-supported system will be established in areas such as analysing climate data, modelling, forecasting and early warning systems, effective management of water resources and agricultural areas, development of policies based on scientific data and raising social awareness.

Pilot Region and Test Application
Pilot and test implementation is critical to understand the impacts of climate change on agricultural production and to develop appropriate adaptation strategies. These studies ensure that agricultural practices can adapt to new climatic conditions and sustainable production methods are developed. The pilot region offers an ideal environment to produce solutions that are applicable in local conditions and to test these solutions on a large scale. Thus, systems that will increase agricultural productivity and become more resilient to climate change can be created.

Site Identification and Data Collection

Pilot Area:
The pilot research area in Fethiye district of Mugla province, located in the Mediterranean region of Turkey, is an ideal example for studying the impacts of climate change on agricultural production. This region has been selected as an important field research area to identify crops that were productive in

the past but are now experiencing yield losses, as well as species that have started to grow in new climate types.

Fethiye district of Muğla has been heavily affected by climate change. Agricultural activities in the region are directly affected by climate changes such as increasing temperatures, changing rainfall regimes and drought. For example, climate change has increased the rate of spread of plant diseases and pests, which has had negative impacts on local agriculture (US EPA) (EPA).

In addition, increasing temperatures and changing climatic conditions have altered the growing periods and productivity of some plant species. Some species are no longer able to grow in this region due to higher temperatures and changing rainfall regimes, and are being replaced by new species that are more resistant to the climate. This situation is important to examine the adaptation processes of agricultural systems in Fethiye and their ability to adapt to these new conditions.

The aim of the research is to determine how current and potential agricultural products in the region respond to climate change and to develop future agricultural strategies based on these responses. For example, some plant species may increase their productivity with increasing CO_2 levels, while others may experience a decrease in quality and nutritional value. Studying such dynamics is critical to ensure the agricultural sustainability of the region.

Consequently, the pilot research site in Fethiye was selected to understand the impacts of climate change on agricultural production and to identify strategies to be implemented to cope with these impacts. Such research is necessary to ensure that agricultural activities in the region are sustainable in the future.

Phase 1 : Contact with Local Farmers:

- In order to test the system, the use of the system is opened to the people of the region free of charge by co-operating with local farmers.

- Farmers are informed about the functioning and potential benefits of the model. Visibility studies are carried out.

Caution: The Pilot field implementation planned in the first phase is currently temporarily suspended in order to reduce the amount of funding we need. During the process, multiple open calls for proposals will be evaluated to ensure appropriate budgeting conditions and will be re-launched when appropriate.

Phase 2: Pilot Plot Trial: (inactive)

- In a small pilot plot area, a small-scale agricultural trial of the species envisaged by the system will be carried out.

- The trial area will be located on a designated agricultural land in the Fethiye region and the following operations will be carried out in this area:

o Land Preparation: Soil analyses will be made and appropriate agricultural techniques will be applied.

o Plant Selection and Planting: Plant species predicted by the LLaMA 3 model will be planted.

o Irrigation and Maintenance: Irrigation and maintenance operations will be carried out based on climate data.

o Productivity Analysis: The growth and productivity performance of the plants will be monitored regularly and the data will be analysed.

Open Source Deployment:

- The APIs of the model for access to more climate data and trained model values will be distributed as open source and tested by the community.

Evaluation:

- The results of the pilot region phases will be evaluated according to the determined criteria.
- Depending on the success, the model will be planned to be extended and applied to other regions.

Milestones:

- Project design, establishment of necessary local contacts (completed)
- Design of the model architecture (Completed)
- Completion of field research data collection and processing (in progress)
- Construction of the model architecture (in progress)
- Pilot and test studies
- Open source distribution of the model

M: Month   P: Milestones

Timetable

	M1	M2	M3	M4	M5	M6
P1						
P2						
P3						
P4						
P5						
P6						

Conclusion

The ECOLlama Ver 1.0 project offers an important innovation in combating climate change in the Mediterranean region of Turkey. This open-source ecological adaptation project aims to reduce the negative impacts of climate change and increase agricultural productivity by using Meta's LLaMA 3 artificial intelligence model.

The LLaMA 3 model used in the project is an important tool for developing strategies suitable for regional climate conditions, with its ability to analyse large data sets and predict future climate changes. This technology can be used to increase productivity in the agricultural sector and manage water resources more effectively by effectively processing complex climate data with deep learning and natural language processing algorithms.

The open-source nature of ECOLlama enables a wide range of users and developers to contribute to the project and ensures the continuous development of the technology. This encourages scientific collaboration and knowledge sharing, enabling more effective and sustainable solutions to combat climate change.

The project demonstrates the potential of the LLaMA 3 model retrained with region-specific data, while providing concrete solutions to agricultural and environmental problems in the Mediterranean region. The application of such technology will be an important step towards mitigating the social, economic and environmental impacts of climate change.

In conclusion, the ECOLlama Ver 1.0 project offers an innovative approach in combating climate change and aims to develop effective strategies at regional and global level by making the best use of the potential of artificial intelligence in this field. In this context, the successful implementation of the project can create a model that will provide social and economic benefits while increasing agricultural productivity and ecosystem sustainability.

CLOSURE :

End of Project and Long Term Goals: Initial Work for Version 2

At the end of the project process, if the evaluation criteria we have set are successfully met, we will realise our goal of transforming our local model into a distributed network and making it available for global use. In this direction, comprehensive studies on Version 2 will be initiated. These studies will be carried out simultaneously with the system development steps, together with the constructions of optimisation, visibility and awareness processes.

Source

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