Cassava Leaf Disease Detection App

This is an app that helps farmers in Africa distinguish between 4 different types of diseases and also can recognize rather the plan is healthy. This helps villagers and other users to cure their crops saving them time and resourses for expert to come to them for check. Lets not forget also that the Cassava plan is Africaans main source of food and also has significans in their culture.

Created by: vtanevva
Created on: April 8, 2024 11:04 PM
Changed on: April 18, 2024 8:21 PM

Context of use: Other

Impact on society

What impact is expected from your technology?

What is exactly the problem? Is it really a problem? Are you sure?

As the second-largest provider of carbohydrates in Africa, cassava is a key food security crop grown by smallholder farmers because it can withstand harsh conditions. At least 80% of household farms in Sub-Saharan Africa grow this starchy root, but viral diseases are major sources of poor yields. With the help of data science, it may be possible to identify common diseases so they can be treated.

Are you sure that this technology is solving the RIGHT problem?

Yes, because the system can distingish between the classes easily - people do not have to wait (waste time) until an expert comes, and also no matter if the app is sold or given away for free for people in need, it would cost less to the users.

How is this technology going to solve the problem?

Considering one of the model's layers maps only the important features of the different classes, the system itself can distinguish well and predict what is the disease of new image of unhealthy Cassava plant.

What negative effects do you expect from this technology?

Experts in the sphere could loose a lot of their clients. Imagine the app is sold online in standard prize. Wont you prefer to buy it one time or even to have to pay for abonament that even can cost as much as calling the expert. Using the app would save the time until this person comes and is done for seconds.

In what way is this technology contributing to a world you want to live in?

It contributes by helping users save their plants from dying. Especially in Africa, Cassava is very important as its one of the main food resouses.

Now that you have thought hard about the impact of this technology on society (by filling out the questions above), what improvements would you like to make to the technology? List them below.

I would liek to make the app be able to use for even older devices. Imaging being able to run it in the Nokias used in 2005.

Hateful and criminal actors

What can bad actors do with your technology?

This category is only partial filled.

In which way can the technology be used to break the law or avoid the consequences of breaking the law?

If the app is successful, there might be attempts to reverse engineer or copy its software without permission, leading to copyright infringement issues. Also, as the app would collect and store data, there could be potential misuse of this information, especially if not properly secured - this includes selling farmer data without consent, which could lead to privacy violations.

Can fakers, thieves or scammers abuse the technology?

This question has not been answered yet.

Can the technology be used against certain (ethnic) groups or (social) classes?

This question has not been answered yet.

In which way can bad actors use this technology to pit certain groups against each other? These groups can be, but are not constrained to, ethnic, social, political or religious groups.

This question has not been answered yet.

How could bad actors use this technology to subvert or attack the truth?

This question has not been answered yet.

Now that you have thought hard about how bad actors can impact this technology, what improvements would you like to make? List them below.

This question has not been answered yet.

Privacy

Are you considering the privacy & personal data of the users of your technology?

This category is only partial filled.

Does the technology register personal data? If yes, what personal data?

The app uses photographs of crops to analyze disease so theres a potential for these images to include background elements that could identify a location or individual.

Do you think the technology invades the privacy of the stakeholders? If yes, in what way?

This question has not been answered yet.

Is the technology is compliant with prevailing privacy and data protection law? Can you indicate why?

This question has not been answered yet.

Does the technology mitigate privacy and data protection risks/ concerns (privacy by design)? Please indicate how.

This question has not been answered yet.

In which way can you imagine a future impact of the collection of personal data?

This question has not been answered yet.

Now that you have thought hard about privacy and data protection, what improvements would you like to make? List them below.

This question has not been answered yet.

Human values

How does the technology affect your human values?

This category is only partial filled.

How is the identity of the (intended) users affected by the technology?

The project impacts the identity and social dynamics of its users in various ways.
If two friends are using the product, it could enhance their relationship by providing a common tool for collaboration and support in managing their crops, potentially leading to shared learning experiences and mutual assistance. There's a potential for the app to be perceived negatively if it is seen as replacing human expertise or if errors in disease detection lead to significant crop loss.
Nevertheless, by emphasizing the scientific understanding, the app may reinforce a worldview that values technological solutions to agricultural challenges.

How does the technology influence the users' autonomy?

This question has not been answered yet.

What is the effect of the technology on the health and/or well-being of users?

This question has not been answered yet.

Now that you have thought hard about the impact of your technology on human values, what improvements would you like to make to the technology? List them below.

This question has not been answered yet.

Stakeholders

Have you considered all stakeholders?

This category is only partial filled.

Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by answering these questions.

Name of the stakeholder
Elina Todorova - biologist

How is this stakeholder affected?
-

Did you consult the stakeholder?
No

Are you going to take this stakeholder into account?
No

Name of the stakeholder
users - farmers in Africa

How is this stakeholder affected?
-

Did you consult the stakeholder?
No

Are you going to take this stakeholder into account?
No

Did you consider all stakeholders, even the ones that might not be a user or target group, but still might be of interest?
-

Now that you have thought hard about all stakeholders, what improvements would you like to make? List them below.
This question has not been answered yet.

Data

Is data in your technology properly used?

This category is only partial filled.

Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into account in the technology?

Yes, I'm aware of these fundamental issues with data, and they are important considerations when developing technology like this. It is ensured that the data used to train the app comes from diverse sources and reflects various stages of disease, reducing the subjective nature of any single source. Also, the images data is deriven from various farming conditions to mitigate bias and improve the app's accuracy across different environments.

The app uses machine learning algorithms (CNN) capable of handling complex patterns, but also it is supplemented with user feedback and expert review to handle anomalies and unusual cases.

How does the technology organize continuous improvement when it comes to the use of data?

This question has not been answered yet.

How will the technology keep the insights that it identifies with data sustainable over time?

This question has not been answered yet.

In what way do you consider the fact that data is collected from the users?

This question has not been answered yet.

Now that you have thought hard about the impact of data on this technology, what improvements would you like to make? List them below.

This question has not been answered yet.

Inclusivity

Is your technology fair for everyone?

This category is only partial filled.

Will everyone have access to the technology?

This question has not been answered yet.

Does this technology have a built-in bias?

When the image contains a yellow leaf, there could be multiple interpretations. Firstly, this could be due to a disease or lack of sunlight and the plant to actually be healthy. Secondly, in the dataset can be found images of yellow leaf assigned to class 0 and class 1 as well as class 4 which is the healthy plant. This is why it is used a deep learning model involve multiple processing layers to learn representations of data with multiple levels of abstraction.

Does this technology make automatic decisions and how do you account for them?

This question has not been answered yet.

Is everyone benefitting from the technology or only a a small group? Do you see this as a problem? Why/why not?

This question has not been answered yet.

Does the team that creates the technology represent the diversity of our society?

This question has not been answered yet.

Now that you have thought hard about the inclusivity of the technology, what improvements would you like to make? List them below.

This question has not been answered yet.

Transparency

Are you transparent about how your technology works?

This category is only partial filled.

Is it explained to the users/stakeholders how the technology works and how the business model works?

Yes. This is why I created my Transparency document where you can find our everything essential regarding the project. Moreover, in the current Jupyter file of the project, there are added explanations for each step, that help the user understand even if he is not in the IT sphere.

If the technology makes an (algorithmic) decision, is it explained to the users/stakeholders how the decision was reached?

This question has not been answered yet.

Is it possible to file a complaint or ask questions/get answers about this technology?

This question has not been answered yet.

Is the technology (company) clear about possible negative consequences or shortcomings of the technology?

This question has not been answered yet.

Now that you have thought hard about the transparency of this technology, what improvements would you like to make? List them below.

This question has not been answered yet.

Sustainability

Is your technology environmentally sustainable?

This category is only partial filled.

In what way is the direct and indirect energy use of this technology taken into account?

This is very important in my project as in order to be delivered considersing my target audience , the lack of access to even old devices in Africa. To reduce the energy used in accessing cloud services, the app might include an offline mode that allows it to function without a constant internet connection, thereby saving the energy that would be used in data transmission.

Do you think alternative materials could have been considered in the technology?

This question has not been answered yet.

Do you think the lifespan of the technology is realistic?

This question has not been answered yet.

What is the hidden impact of the technology in the whole chain?

This question has not been answered yet.

Now that you have thought hard about the sustainability of this technology, what improvements would you like to make? List them below.

This question has not been answered yet.

Future

Did you consider future impact?

This category is only partial filled.

What could possibly happen with this technology in the future?
With more farmers able to quickly diagnose and treat diseases, overall crop health and yields could improve significantly, enhancing food security and economic stability in rural communities. This means if farmers can diagnose crop diseases themselves, the reliance on agricultural experts may decrease, affecting the traditional roles of these experts within agricultural communities.On the other hand,farmers' attitudes towards technology could shift significantly, with increased trust and reliance on digital tools for agricultural management.

Sketch a or some future scenario (s) (20-50 years up front) regarding the technology with the help of storytelling. Start with at least one utopian scenario.
This question has not been answered yet.

Sketch a or some future scenario (s) (20-50 years up front) regarding the technology with the help of storytelling. Start with at least one dystopian scenario.
This question has not been answered yet.

Would you like to live in one of this scenario's? Why? Why not?
This question has not been answered yet.

What happens if the technology (which you have thought of as ethically well-considered) is bought or taken over by another party?
This question has not been answered yet.

Impact Improvement: Now that you have thought hard about the future impact of the technology, what improvements would you like to make? List them below.
This question has not been answered yet.