Introduction to PlantVillage Nuru

What is PlantVillage Nuru
How it was made
What can it do
How to get Nuru
How to use Nuru
Things to consider when using NURU
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Work with a team of researchers at IITA and PlantVillage to develop Nuru, evaluate its performance and train its users - agricultural extension officers and farmers.
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Worked with Nuru team from IITA and worked with PlantVillage to develop Nuru, evaluate it’s performance and train it’s users (agricultural extension officers and farmers).
2017 & 2019 WINNER

PlantVillage Nuru: Pest and disease monitoring using AI
What is PlantVillage Nuru (Nuru)?
An **mobile app** for identification of disease symptoms and pest damage on plants

**NURU** – Swahili word for **Light**
‘The light that farmers can use to solve their agricultural problems’
HOW WAS PLANTVILLAGE NURU MADE?

The object and image detection technology (Tensor flow) developed by Google was modified such that it can detect objects (plant leaves) and patterns (disease symptoms).
The Cassava - Artificial intelligence system

Trained using thousands of images of healthy, diseased and mite-infested cassava leaves from different cassava varieties.

Nuru can differentiate healthy and diseased/infested plants.
Users of Nuru – Cassava AI
What can Nuru do?
The Cassava AI – PlantVillage Nuru

1. Determine presence of diseases symptoms or pest on the crop (CMD, CBSD and CGM-damage).
2. Gives feedback (real-time)
3. Shows you the symptoms of the disease/symptoms it has recognize (teaching tool)
4. Give you advice on management and/or control practices for the disease/pest it has recognize

All this can be done in absence of internet connection
Where to get **PlantVillage NURU**
Where to get **Plant Village NURU**

- **Install**
- **Where to get**
- **PlantVillage NURU**

- **Update**
- **WHAT'S NEW**
  - Implemented the detection logic in Cassava AI and FAW AI Proceed
  - Sending the probability and position along with the detected image
Where to get **PlantVillage NURU**

PlantVillage is a public good resource built at Penn State University. The goal of PlantVillage is to help farmers around the world access knowledge on crop health and make decisions that can improve the amount of food they grow and their ability to get that food to market for a fair price that helps farmers improve their livelihood.

In this app, you will receive advice on what to do on your farm. This advice is provided to you via scientists at UN FAO, CGIAR as well as from published material from non-profit groups like...
Cassava AI - Features

Login

Register
- Your Name*
- Email
- Mobile Number
- Select user type*
  - Farmer
  - Tanzania
- Password*
- Confirm Password*

Register Now

Sign Up

A confirmation email was sent to your email account. You must follow the instructions in the email before your account can be activated.
Nuru’s Features

![PlantVillage Nuru]

- LATIFA MRISHO
- My Account
- My Farms

- Sun: 29° 0.0mm
- Mon: 28° 1.9mm
- Tue: 30° 0.0mm
- Wed: 30° 2.1mm
- Thu: 28° 4.2mm

![Nuru]

- Fall Armyworm Al
- Cassava Al
- COMING SOON
Nuru’s Features

- Login
- Register
- Here you can Post a question to the Community

Resources:
- Crops
- Farm Management
- Video Library
- Pests & Diseases
- Increase Yield

Settings:
- Here you can find
  - Change Language
  - My Account
  - Notification settings
  - Messages
  - Terms and Conditions
  - Share App
  - Logout
Cassava AI – Disease diagnosis

Check your plants options

Hi, I’m Nuru and I will help you identify if your cassava plant is healthy or not.

Please press the proceed button to check your plant for cassava diseases or press the yellow button to scout your field.

Hi, I am Nuru. I will help you inspect your cassava plant.

Please press the proceed button to check your plant for cassava diseases or press the yellow button to scout your field.

Real time diagnosis

Disease comparison

How to use Nuru

Advice

Chat

Proceed

Scout

Proceed

Scout
Cassava AI – Disease diagnosis

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Cassava AI – Disease diagnosis

Adding farms
Cassava AI – Disease diagnosis

Whole plant diagnosis

Please show me the first leaf that does not look healthy from the top of the plant. Press start when the leaf is in focus.

Now let’s look at three leaves from the bottom of the plant. When you show me the leaf, please hold the phone so you can see the whole leaf and be sure the leaf is in focus. It may be easier to focus if you hold your hand behind the leaf.
Cassava AI – Disease diagnosis

Whole plant diagnosis

After looking at six leaves, I did not detect any disease I recognize.

Would you like to learn about cassava diseases in your region?

'Yes'  Send Feedback

After looking at six leaves, I think your plant has two diseases: CMD cassava mosaic disease and CBSD cassava brown streak disease.

Would you like to get advice on how to manage these diseases?

'Yes'  'No'

Disease Diagnosis

Your plant has CMD. It cannot be cured but it can be controlled by using clean planting material, which preferably has been certified. You can also use CMD-resistant planting materials. Please do not get planting material from neighbours unless you are sure it is not infected. Consult your agricultural extension officers to get information about the sources of clean planting materials. If you are in Tanzania or Nigeria, you can use www.seedtracker.org to identify sources of certified and CMD-resistant planting materials.

Your plant has CBSD. It cannot be cured but it can be controlled by using clean planting material, which preferably has been certified. You can also use CBSD-resistant

Send Feedback

Back To Home

The connecting with SeedTracker requires you to be connected to the internet
6 LEAVES DIAGNOSIS

We will look at six leaves: three leaves on the top and three leaves on the bottom, then I will give you a diagnosis.

When you show me the leaf, please hold the phone so you can see the whole leaf and be sure the leaf is in focus. It may be easier to focus if you hold your hand behind the leaf.
Cassava AI – Disease diagnosis

‘Field inspection’ option
Cassava AI – Disease diagnosis

Field inspection

Welcome LATIFA MRISHQ, carry me over 10 different cassava plants on your farm.

Are you at Plant 1?

Please move me over 1 damaged leaf

No damage detected.

Are you at Plant 2?

Please move me over 1 damaged leaf

No damage detected.

Please move me over 1 damaged leaf

No damage detected.

Connect with other farmers and seed suppliers?

‘Yes’  ‘No’

Nearby Nuru Users

Farmer
Seed supplier
Extension worker

Dar es Salaam
Things to consider when using Nuru
Things to consider when using Nuru

1. Time
   • Reflection of sunlight makes the leaves appear shiny and may lead to failure of diagnosis or misdiagnosis.
   • Early morning (before 10 am) or late afternoon (after 4 pm)

2. Leaf selection
   • Make sure you select leaves that appear to be unhealthy to give Nuru higher chances of identifying the diseases in your plant.
   • Make sure the leaf is focused and you hold the phone steady during diagnosis (hold the leaf on your palm when necessary).
Things to consider when using Nuru

3. Disease type or severity

- Mild infections are not easily identified
- Bacterial infections, fungal infections and nutrient deficiencies can also not be identified

There is possibility of adding more diseases/conditions depends on availability of funds
Things to consider when using Nuru

4. Type of phone

• Android phone $\geq$ 2 GB RAM - Technology developments allows for smaller apps $\gg$ more affordable phones

• Sensitivity of the camera – Newer versions of smart phones tend to have more sensitive cameras (test the phones before purchasing bulk orders)

• Nuru is continuously being updated to account for the changes in phone capabilities
Things to consider when using Nuru
Diagnosis feedback
PLANTVILLAGE DATABASE
The images uploaded in the database are used to improve diagnostic capability of Nuru hence do your best to use Nuru while connected to the internet.
Only possible if you use Nuru while connected to the Internet, so please opt for this method.
How effective is the cassava AI
Ability of different groups to identify symptoms of cassava diseases on leaves

Refer Article: mrisho et al. 2020
Thank you!

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For any question /clarification/comment please contact

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