Project Banana

Team D
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Embedded Systems Engineering
Real-World Smartphone Sensing

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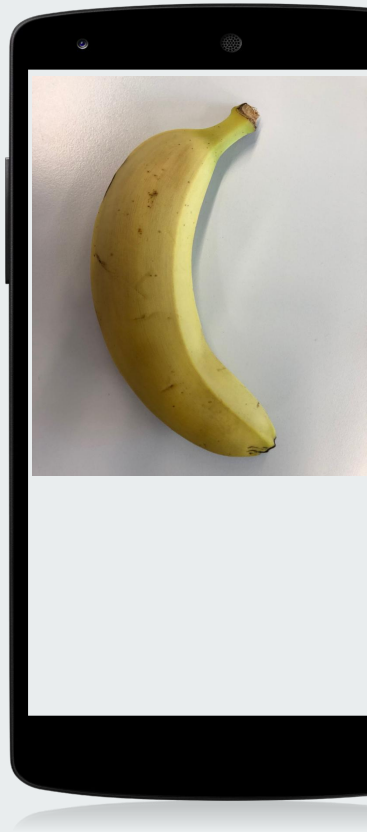


Outline

1. Initial Problem
2. Classification Criteria
3. Neuronal Network
4. GUI Mockup
5. Flowchart

1. Initial Problem

Problem Description

Determination of banana fruit maturity in real-time

Target groups

- ➔ Industry / Retailers
- ➔ End users
- ➔ Persons with intolerances or disabilities

2. Classification Criteria

General Criteria

- ➔ Size / shape
- ➔ Peel texture
- ➔ Degree of hardness
- ➔ Starch-sugar proportion
- ➔ Smell
- ➔ Flavour
- ➔ Peel Colour

Visual Criteria

- ➔ Size / shape
- ➔ Peel colour
- ➔ Development / mottle of brown spots
- ➔ Analysis of peel texture features

Maturity Stages of bananas in three phase

- BananaCo: 3 categories, to reduce initial complexity
- Literature: 7 to 15 maturity levels

unripe ripe overripe

Classification

Class	Peel colour	Maturity stage	Feature Aspects		
			Stern	*Fruiting Body*	*Tip*
1	green	unripe	green	green	green
2	yellow	ripe	yellow	yellow	brown
3	brown	overripe	brown	brown, min. 50 % of peel surface	brown

3. Neuronal Network

Neuronal Network

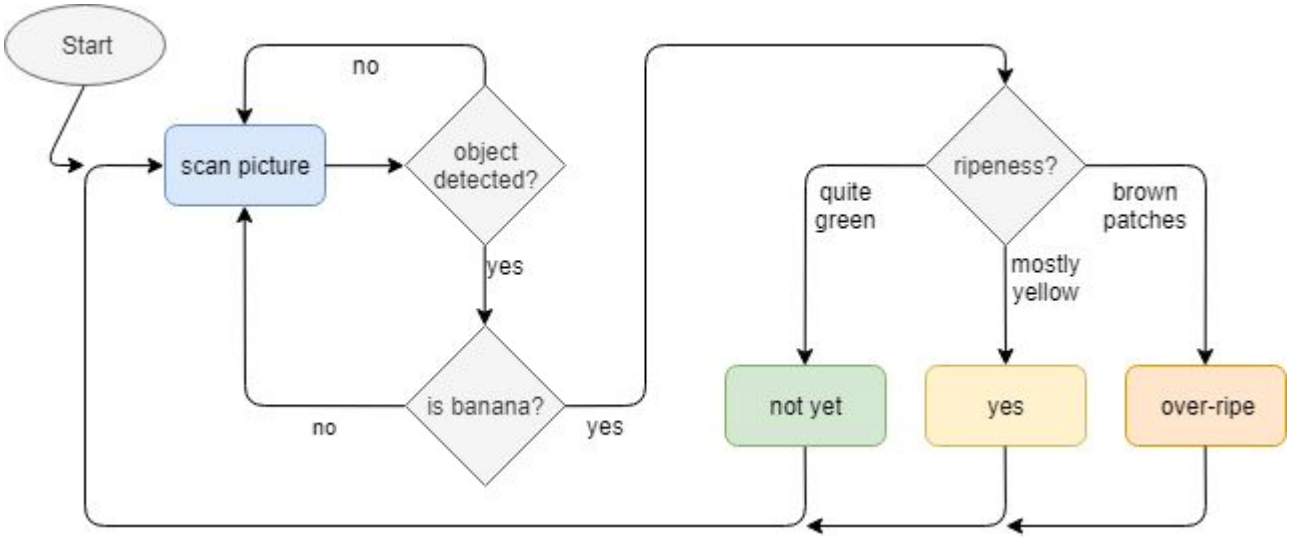
- ➔ Create data sets
- ➔ Train the model
- ➔ Export model
- ➔ Integrate model into smartphone app

4. GUI Mockup

GUI Mockup

5. Flowchart

Flowchart


Start
scan picture
object detected?
no
yes
is banana?
no
yes
ripeness?
quite green
mostly yellow
brown patches
not yet
yes
over-ripe

References

Mazen, Fatma M. A., Nashat, Ahmed A. (2019), Ripeness Classification of Bananas Using an Artificial Neural Network. Arabian Journal for Science and Engineering, 1-10.

Mendoza, F., Aguilera, J. M., Dejmek, P. (2005), Predicting Ripening Stages of Bananas (Musa cavendish) by Computer Vision. Acta horticulturae 682, 1363-1370.

Surya Prabha, D., Satheesh Kumar, J. (2013). Assessment of banana fruit maturity by image processing technique. Journal of food science and technology 52(3), 1316-27.