Sugarcane grading from photos using machine learning

Group: 39
Student: Phuong Pham - 56070503447 - phuongmaipham@icloud.com
Advisor: Dr. Sally E. Goldin

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Problem insight

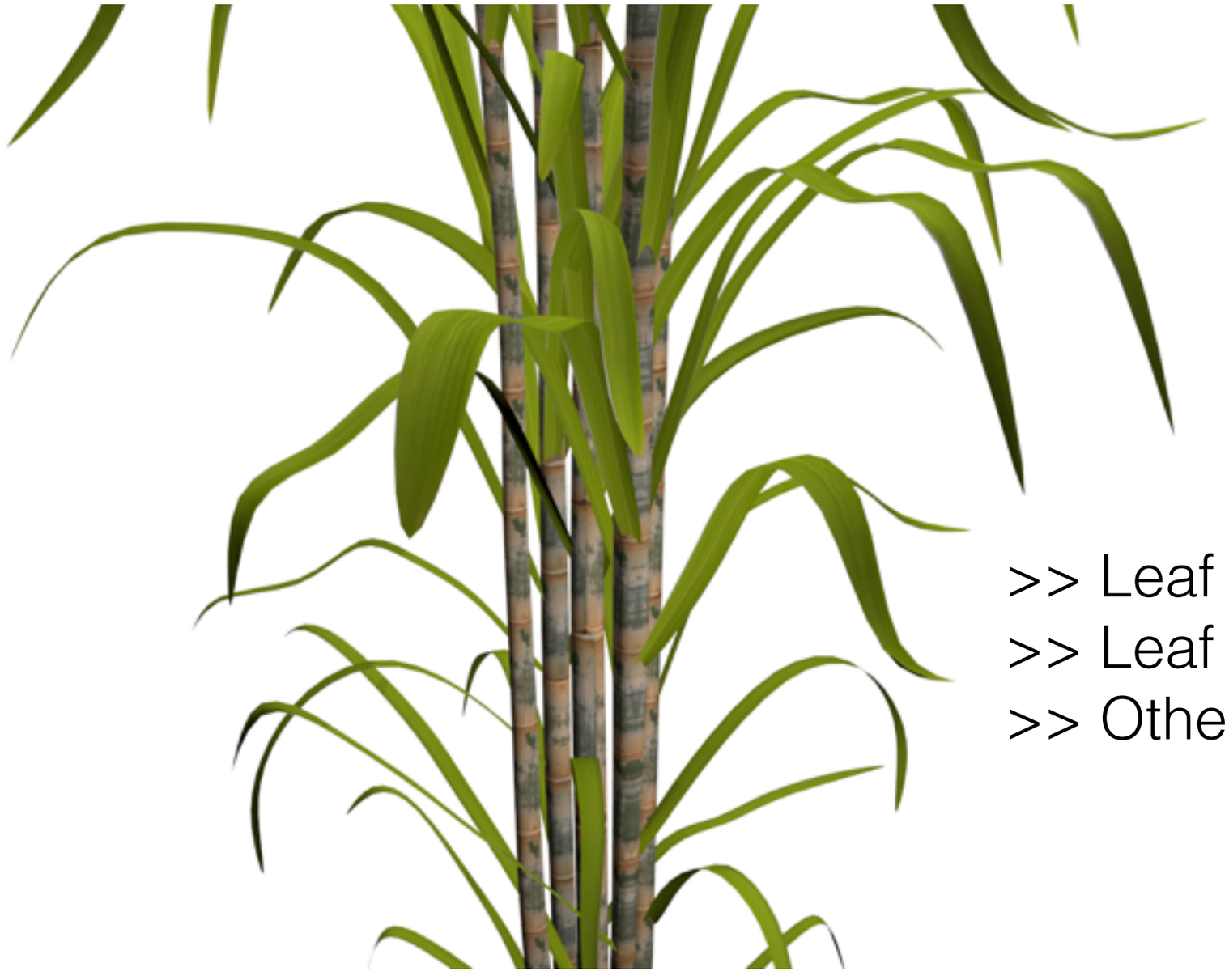
Problem insight

Sugarcane statistics

Source: CROP DIVERSIFICATION IN THAILAND - Chavalvut Chainuvati* and Withaya Athipanan**

Problem insight

Sugarcane health - important to predict the yield



>> Leaf size
>> Leaf colour
>> Others

Close up of a sugarcane bunch

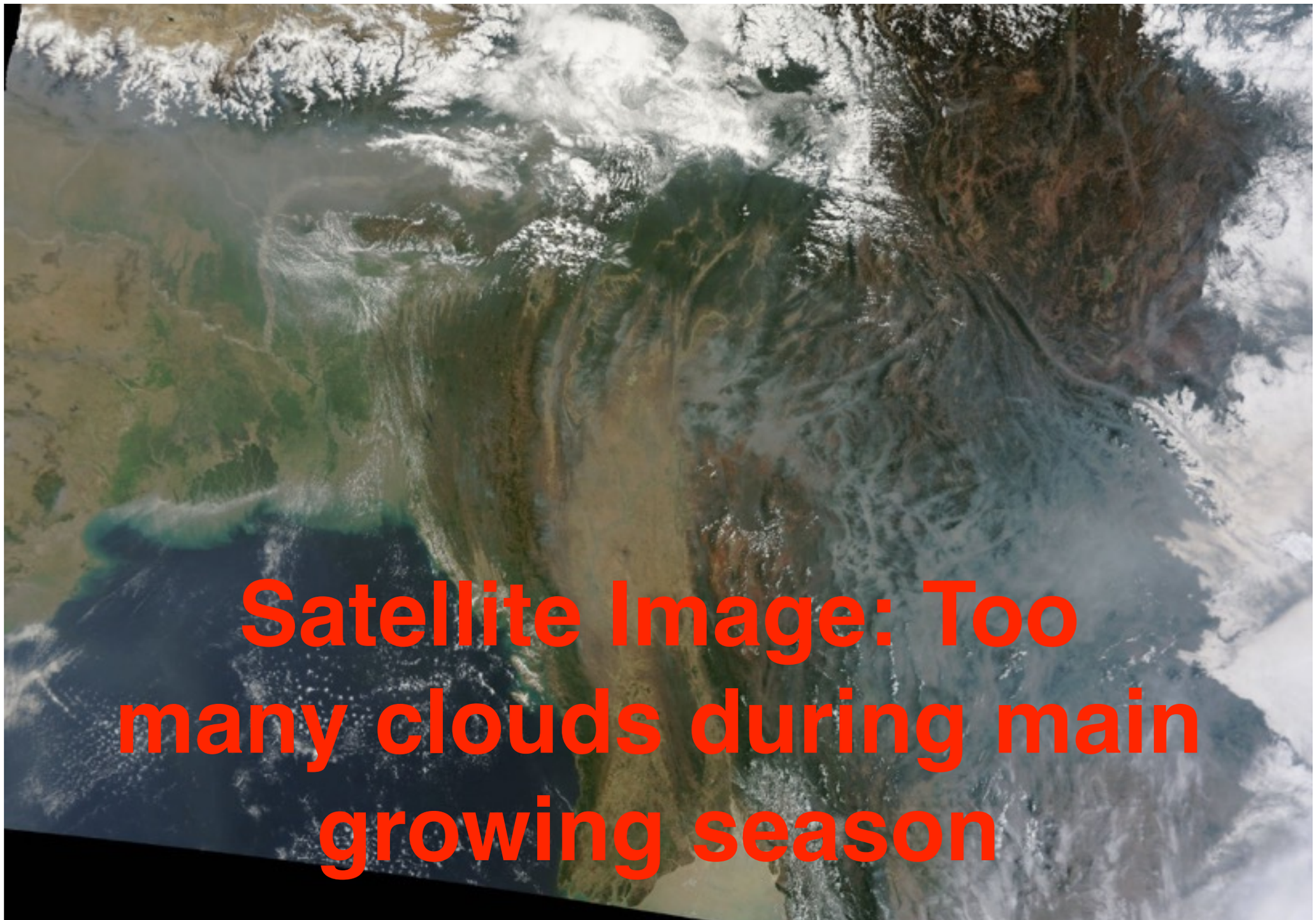
Problem insight

Why do we do this project?

Cane companies typically survey only 10% of their fields

Problem insight

Why do we do this project?



Problem insight

Why do we do this project?

>> We need a convenient way to classify cane quality over a large area

Problem insight

Mobile phone photos

>> Fields are owned by individual farmers
>> Every farmer has a phone
>> Images could be easily obtained

Problem insight

Example data

Good

Problem insight

Example data

Medium

Problem insight

Example data

Poor

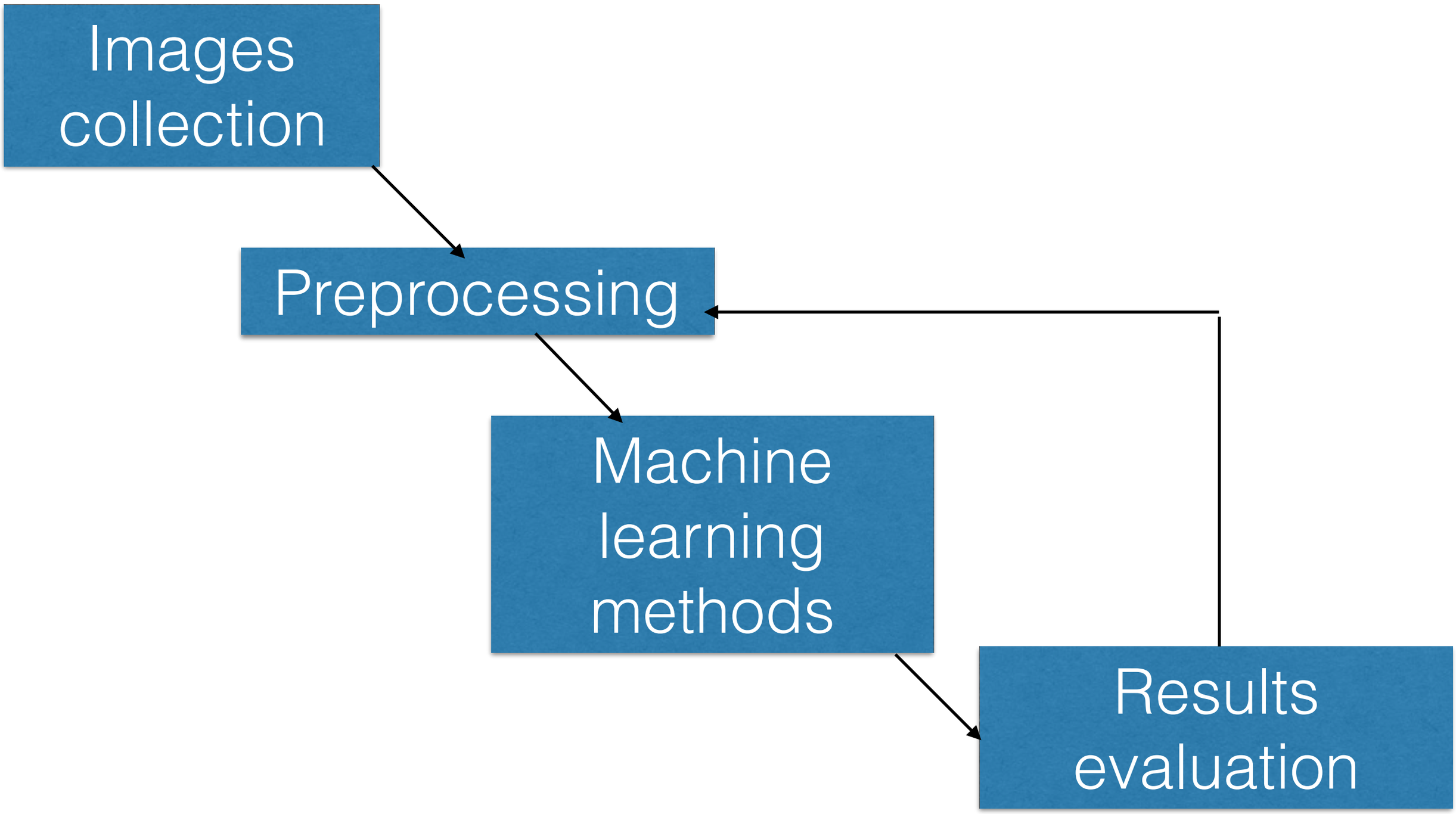
Problem insight

Why do we do this project?

>> A machine learning method to classify cane quality using mobile phone photos

Proposed Method

Proposed method



Proposed method

What we attempt to do

>> Implement several ML models

>> Try them with different parameters

>> Results & method evaluations

Proposed method
Machine learning method

>> Many possibilities (K-means, design tree, SVM)

>>> Which features to extract?
>>> Pictures from different perspectives of the same view

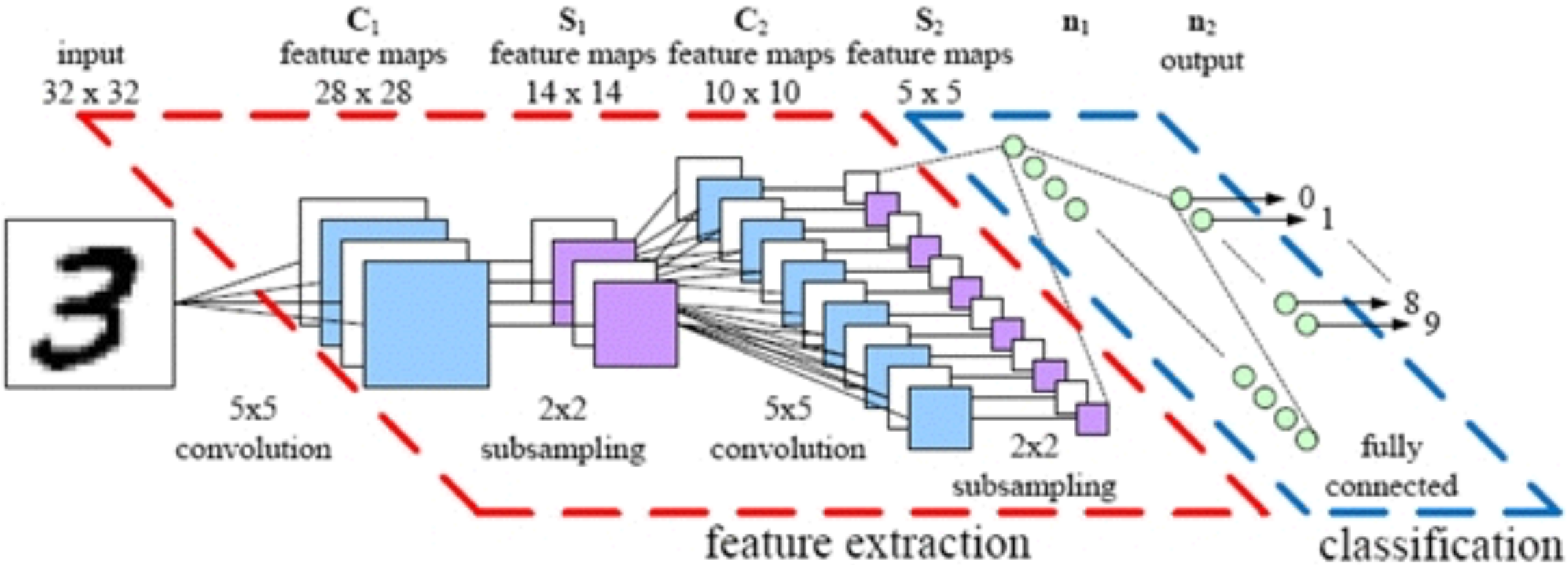
Proposed method
Machine learning method

>> Convolutional neural networks!

>>> automatically learn the important features for decision making

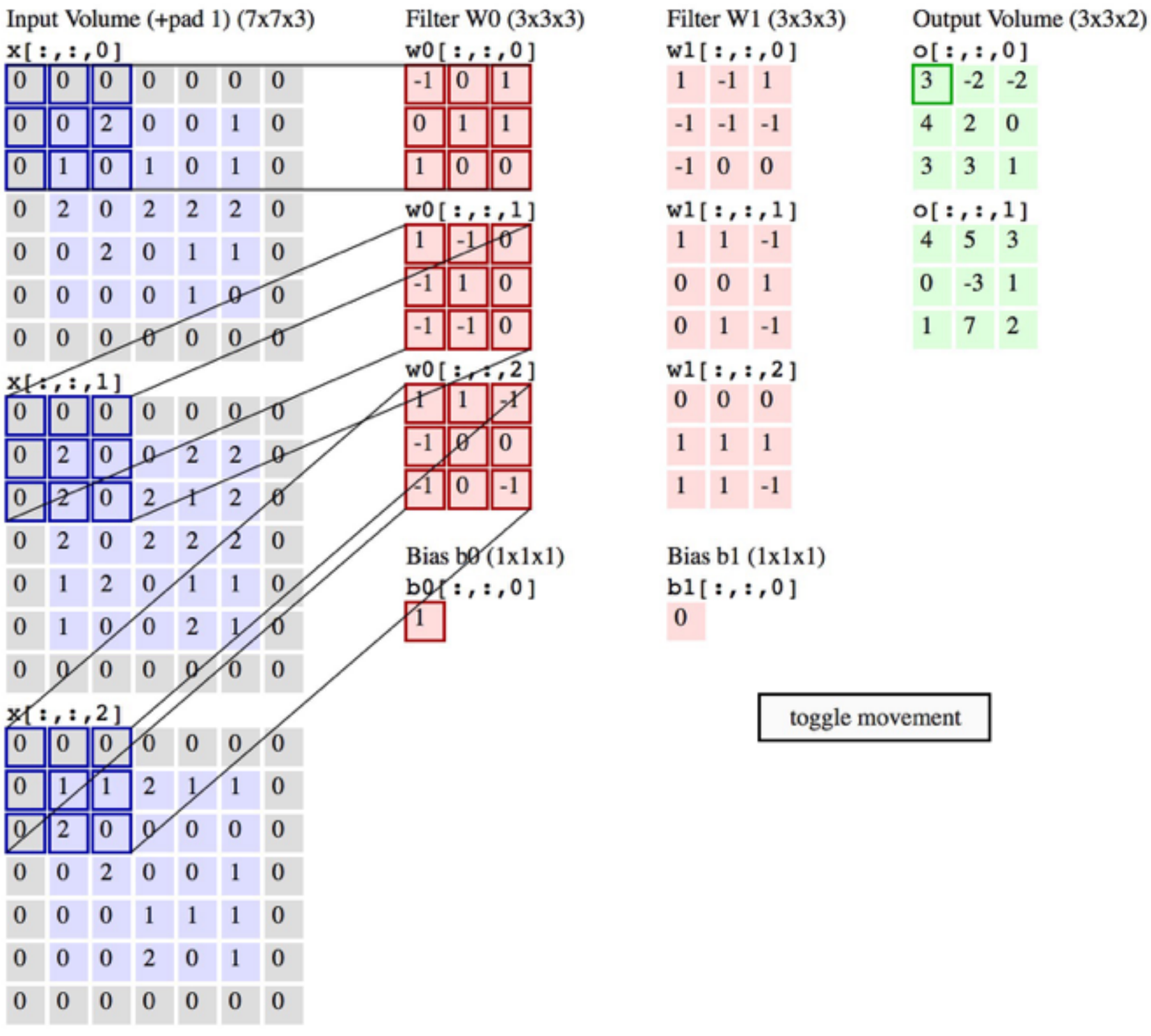
>>> Good approach to tell different between objects in the same basic category

Proposed method
Convolutional neural network



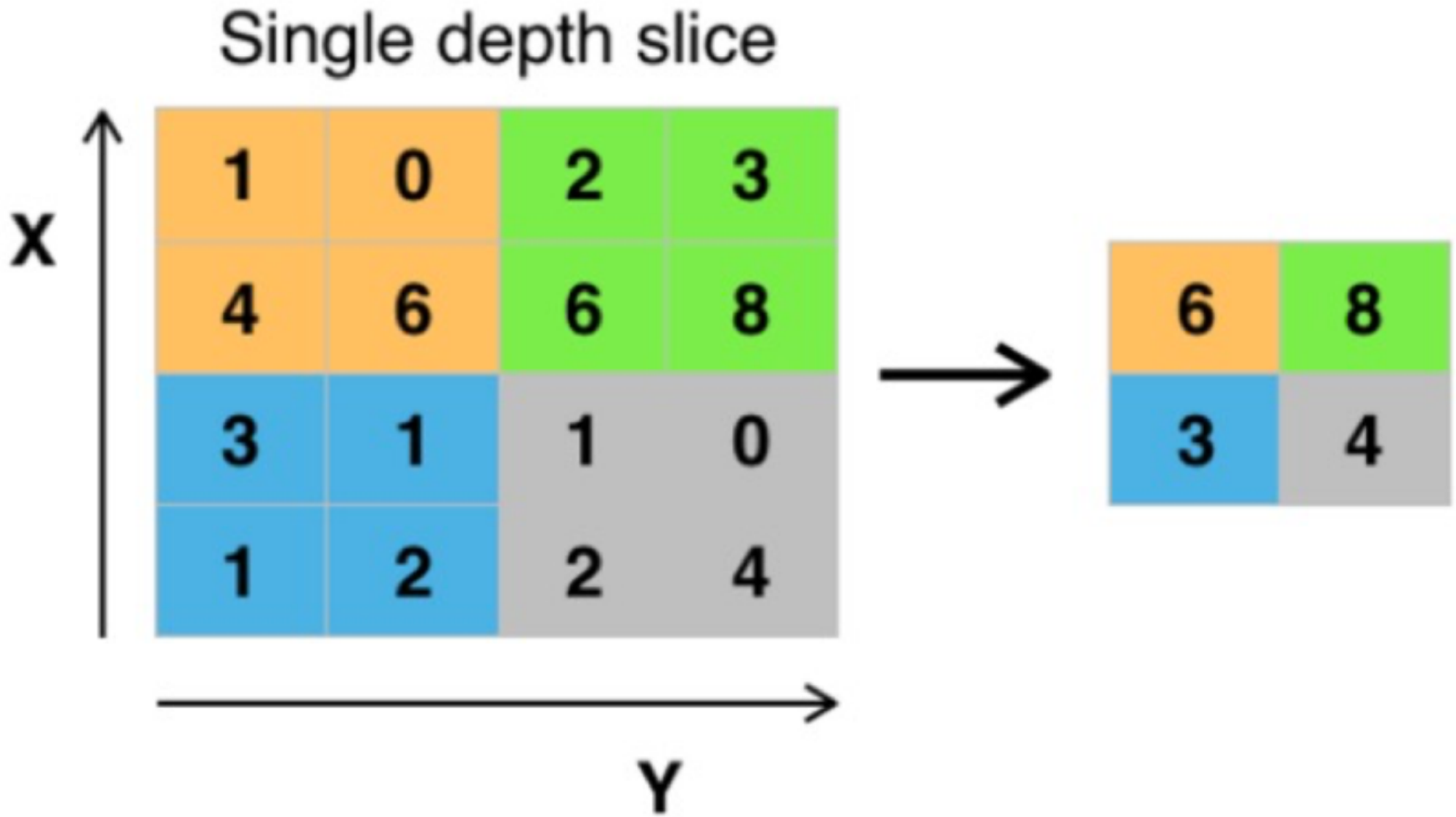
Proposed method

Convolutional neural network -convolutional layer



Proposed method

Convolutional neural network -pooling layer



Proposed method

Cons

>> Requires very **LARGE** dataset

>> Processing speed: **SLOW**!!!

Proposed method

Data Augmentation

>> Scaling

>> Brightness adjust

>> Contrast adjust

>> Flipping

>> Size normalisation

Proposed method

Hardware - NVIDA Geforce Titan X

>> Computing capacity >= 3.0

>> NVIDA card - CUDA tool kit - GPU

Expected results

Expected results

>> Comparison of classification accuracy between different learning models

>> Conclusion regarding the feasibility of using ML for sugarcane health classification

Deliverables

Deliverables
Term 1

>> Experimental data set

>> Experimental design

>> Some prototypes including preprocessing code

>> Decision about frameworks & learning methods

Deliverables

Term 2

>> Complete experimental design

>> Software test bed

>> Results & data analysis

Questions