Machine Learning and Image Processing :
A Vision Approach for Validity Date Recognition from Philippine Government-issued ID

Kharisa Mae G. Macaraig
2014-82999
CMSC 190 Special Problem
Institute of Computer Science

OBJECTIVES

The general objective of this study is to implement an offline computer-based application that will:

- Classify the type of ID a particular query image belongs to,
- Validate and cross check the user using the ID, and
- Extract needed information from an ID, specifically the validity date and ID holder’s name.

METHODOLOGY

- ID Classification
- Image Processing
- Date Extraction and Manipulation

ID Classification

- Does it have a validity date?

Image Processing

- Locate Card

Date Extraction and Manipulation

- Does it belong to the user?
- Is the date still valid?

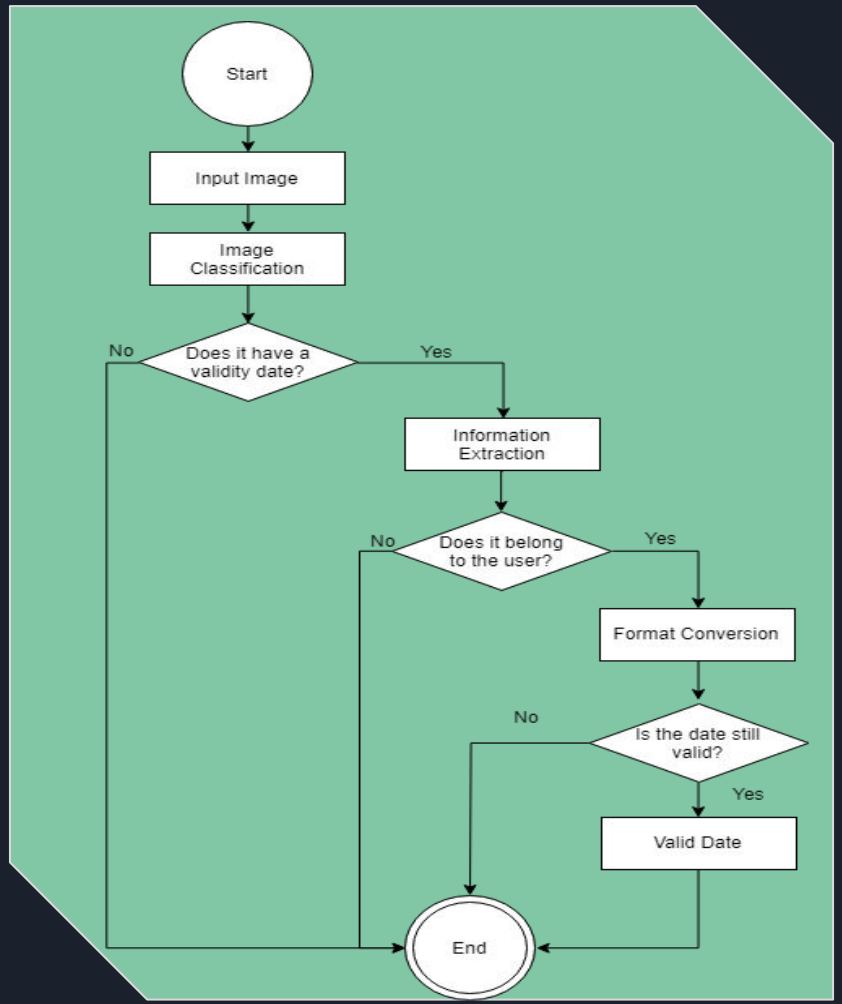

Figure 1: Proposed Data Extraction Method for ID Cards.

DEMO

- Case 1 : ID Card with no expiration date
- Case 2 : ID Card with expiration date
  - A. User does not own the card
  - B. User owns the card, but the card is expired
  - C. User owns the card, and the card is still valid

DEMO

- [x] Case 1 : ID Card with no expiration date
- [ ] Case 2 : ID Card with expiration date
  - [ ] A. User does not own the card
  - [ ] B. User owns the card, but the card is expired
  - [ ] C. User owns the card, and the card is still valid

DEMO

- [x] Case 1 : ID Card with no expiration date
- [ ] Case 2 : ID Card with expiration date
  - [x] A. User does not own the card
  - [ ] B. User owns the card, but the card is expired
  - [ ] C. User owns the card, and the card is still valid

DEMO

- [x] Case 1 : ID Card with no expiration date
- [ ] Case 2 : ID Card with expiration date
  - [x] A. User does not own the card
  - [x] B. User owns the card, but the card is expired
  - [ ] C. User owns the card, and the card is still valid

DEMO

- Case 1 : ID Card with no expiration date
- Case 2 : ID Card with expiration date
  - A. User does not own the card
  - B. User owns the card, but the card is expired
  - C. User owns the card, and the card is still valid

RESULTS AND DISCUSSIONS

ID TYPES	TOTAL # OF DATA	20% OF DATA
Drivers A (Old)	65	13
Drivers B (New)	45	9
No Expiration	75	15
Passport	75	15
PRC	90	18
TOTAL	350	70

Table 1: Table containing the ID types considered in this study including the number of data per type

	Correctly Classified	
ID TYPES	IMAGE CLASSIFICATION	DATA EXTRACTION
Drivers A (Old)	13/13	11/13
Drivers B (New)	9/9	8/9
No Expiration	15/15	13/15
Passport	15/15	11/15
PRC	18/18	14/18
TOTAL	70/70	57/70

Table 2: Tally of correctly classified IDs

CONFUSION MATRIX

		TRUE CONDITION		
		VALID ID (58)	**INVALID ID (12)**	
DETECTED CONDITION	**VALID ID (49)**	49 True Positive	0 False Positive	100% Precision
	INVALID ID (21)	9 False Negative	12* True Negative	57.14% Negative Predictive Value
87.14% Accuracy		84.48% Sensitivity	100% Specificity	91.59% F1-Score

*Four (4) invalid IDs are safely considered as invalid because the system cannot read any word from the image

CONCLUSION

The system was able to classify the ID type that a query image belongs to, among five classifications of IDs considered in this study. Also, the system was able to counter check if the ID belongs to a particular person or not using the extracted card holder's name. Lastly, the system was able to pre-fill an information, and validate it as well, using the extracted date from the attached image document.

The system was proven to be effective and reliable as it yielded an accuracy rate of 87.14%. Also, an F1-Score of 91.59% suggests that the system is sufficiently competitive.

RECOMMENDATION

In this study conducted, however, it is only suitable for identification cards that are taken flat, and images of high quality. To further enhance this application, future developers can perform a perspective crop to accommodate IDs that are taken from a lower or higher angle. Also, school IDs can be included in the list of IDs of interest as they are also accepted in offices. Lastly, since the application is only computer-based, future developers may expand and create an Android, iOS or other platform version for mobile access.