KAR-MO KOLEKTIB: An Automated Vehicle Data Miner Using Computer Vision

John Frederick F. Cantos
Val Randolf Madrid

Background of the Problem

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- Smart cities

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- Smart cities
- Existing technology in the Philippines

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- Smart cities
- Existing technology in the Philippines
- Existing technology in UPLB

Scope and Limitations

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- Collection

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- Collection
- Classification

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- Collection
- Classification
- Place

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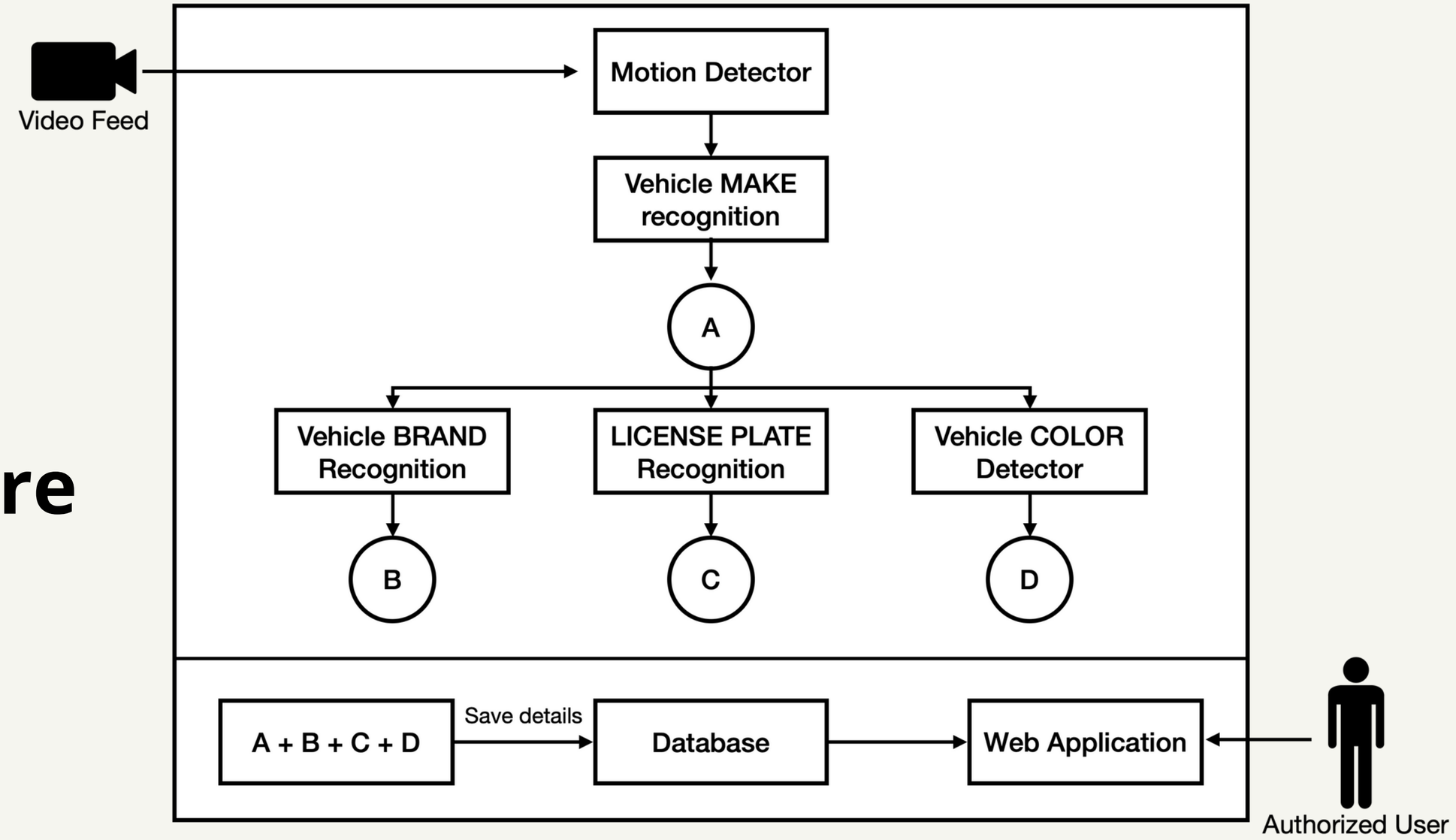
- Collection
- Classification
- Place
- Time

Solution:
Kar-Mo Kolektib

System Architecture



Development Tools

- CPU: Intel Core i3-8145U @ 2.10GHz x 4
- Memory: 12GB
- Graphics: NVIDIA GeForce MX110
- Disk Capacity: 120GB
- Operating System: Ubuntu 20.04 LTS

Development Tools

Vehicle Detection System

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- YOLOv4

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- Python 3.10 and OpenCV 4.6.0

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- YOLOv4
- Python 3.10 and OpenCV 4.6.0
- PyMongo

Development Tools

Web Application

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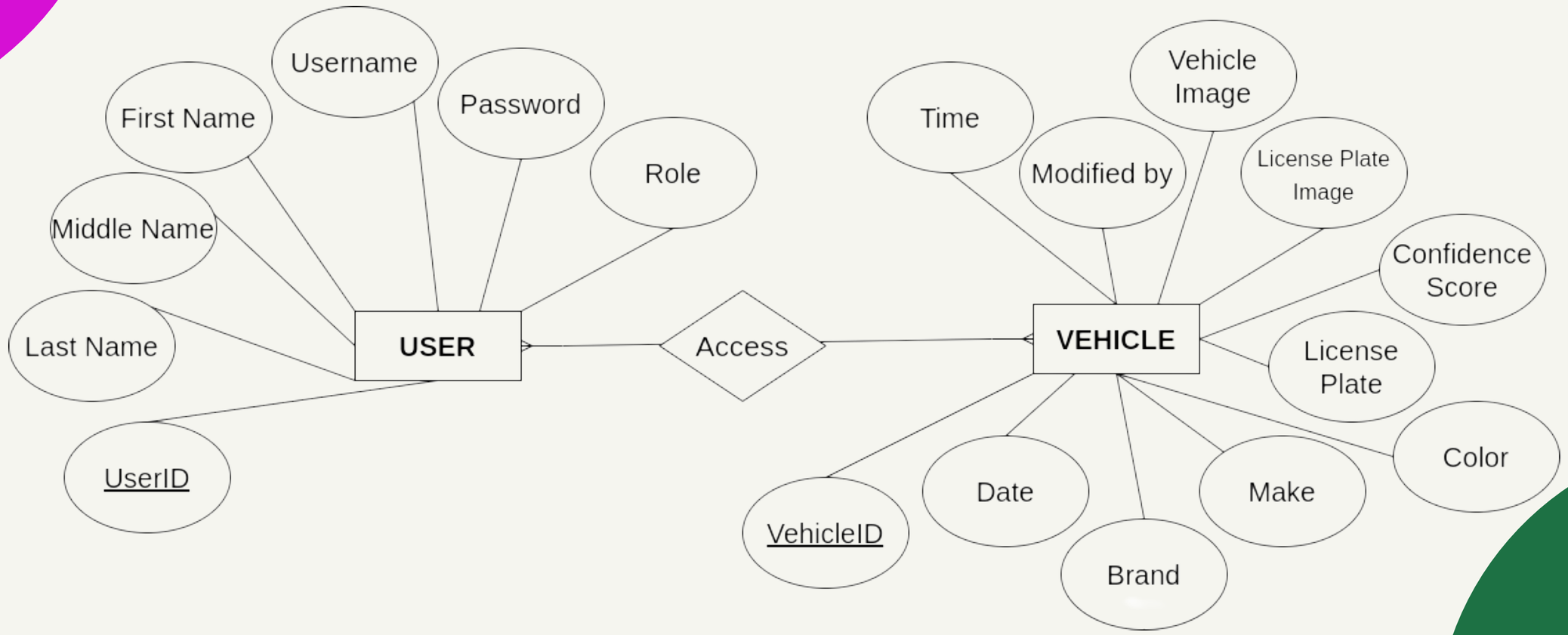
Web Application

- MongoDB
- ExpressJS
- ReactJS
- NodeJS

Entity Relationship Diagram



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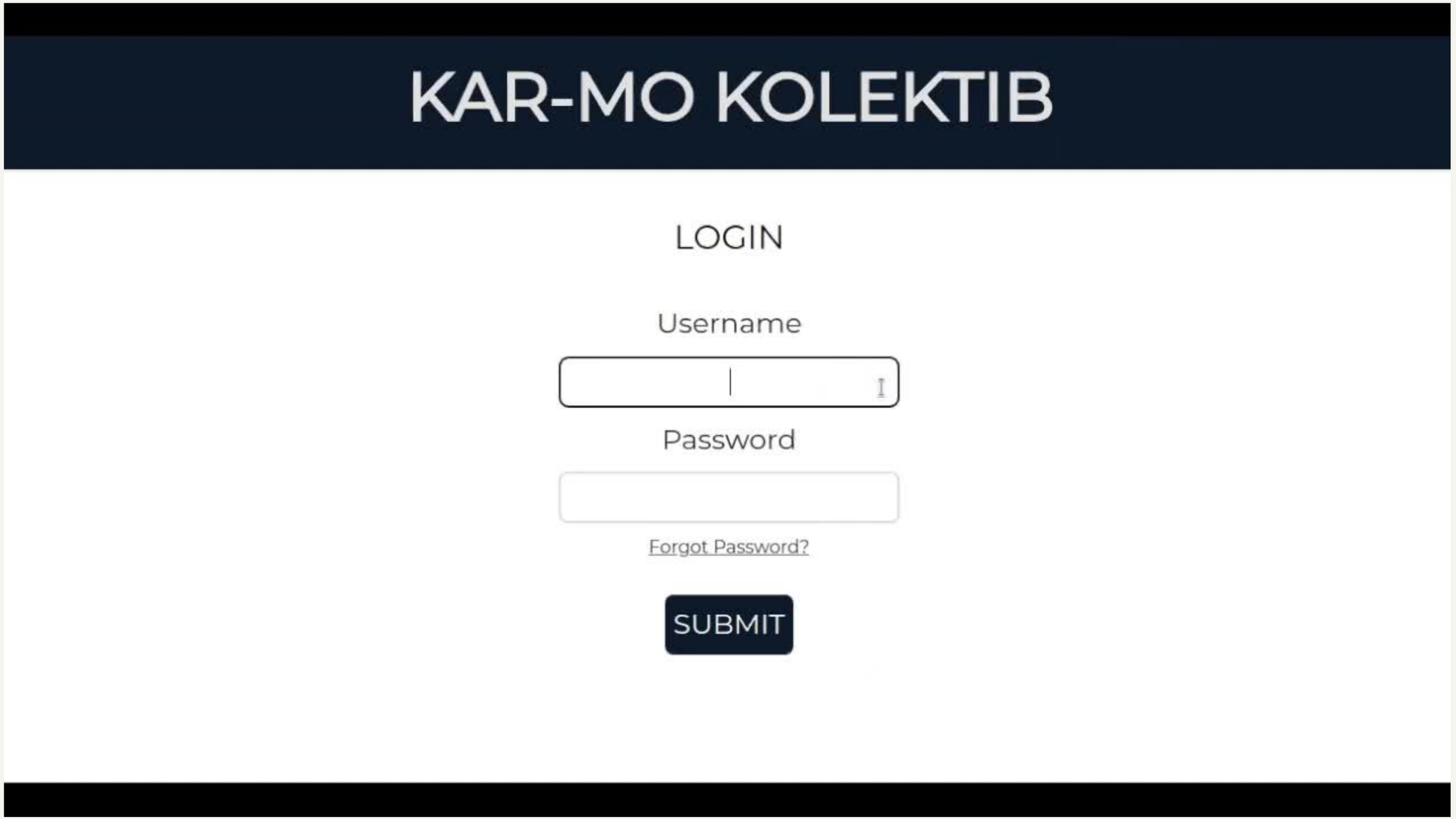
04 Create a web application where authorized users can check the contents of the database and generate reports

Kar-Mo Kolektib Video Demonstration



Results and Discussion

Recorded Video

- 30-minute video
- 8:00 - 8:30 AM
- Motion Detector: 100%

$$\frac{CI}{MC} * 100\% = MotionDetectionAccuracy$$

TABLE II. Number of vehicles detected by motion detector

	MC	CI	II	NI
Motion Detector	136	136	0	0

Results and Discussion

System Record

- 60 out of 136

Make AI Model

- 96.67%

$$\frac{CI + OS}{SR} * 100\% = MakeAccuracy$$

TABLE III. Number of make detected by the make AI model

	CI	II	NI	OS
Make	37	2	0	21

Results and Discussion

Brand AI Model

- 81.67%

$$\frac{CI + P + OS}{SR} * 100\% = BrandAccuracy$$

TABLE IV. Number of brands detected by brand AI model

	CI	II	NI	P	OS
Brand	31	5	6	7	11

Results and Discussion

License Plate AI Model

- 93.33%

$$\frac{CI + OS}{SR} * 100\% = LicensePlateAccuracy$$

TABLE V. Number of license plates detected by the LP AI model

	CI	II	NI	OS
License Plates	51	0	4	5

Results and Discussion

Color Detection Algorithm

- 80%

$$\frac{CI + P + OS}{SR} * 100\% = Color\,Accuracy$$

TABLE VI. Number of colors detected by the color algorithm

	CI	II	P	OS
Color	23	12	7	18

Results and Discussion

Vehicle Duplicates

- Different recorded makes
- System assumption: different vehicles

Results and Discussion

Web Application

- SUS Score: 83.33

TABLE IX. Adjective rating of SUS scores

SUS SCORE	GRADE	DESCRIPTION
greater than 80.3	A	Excellent
68 - 80.3	B	Good
68	C	Okay
51 - 68	D	Poor
less than 51	F	Awful

Conclusion

- Image Capture Device
- Collect vehicle data using machine learning
- Save collected info into database
- Accessed using a web application
- Streamlining the process of data collection in a contactless manner

Recommendation

- Train on larger dataset
- Newer version of YOLO

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- Train on larger dataset
- Newer version of YOLO
- Classifications
- Develop an OCR system
- Better camera
- UI Improvements

References

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