
Milestone 4 Evaluation

VehID

Version 1.0

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Project Client: Clayton Levins, Executive Director of
Smart North Florida

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1 Progress Matrix

Task	Completion %	Remington	Spencer	Thomas	Alexis	To-do
Create Database	50%	50%	0%	50%	0%	NA
Create Web Application	50%	50%	0%	50%	0%	NA
Split Dataset	100%	0%	50%	0%	50%	NA
Create Vehicle Make Recognition Model	100%	0%	50%	0%	50%	NA
Hyperparameter tuning	100%	0%	50%	0%	50%	NA
Data Preprocessing	100%	0%	50%	0%	50%	NA
Sprint Planning	100%	25%	25%	25%	25%	NA
Milestone Evaluation	100%	25%	25%	25%	25%	NA

2 Discussion - Milestone 4

2.1 Tasks

Create Database: We created a basic database to hold all of the data extracted from the CNNs. We are testing various database hosting services so we can have a functioning web application. The database will also include images in the future so that users may manually verify data. The images will be stored in a separate database from the extracted data so that we do not go over the storage limits.

Create Web Applications: We prototyped a web application for data display. This includes pages for query creation, viewing queries already in operation, and a table view of all of the data. The future goal of the web application is to allow users to login and view the queries they have running. The user is prompted to enter a period for the query to search for specific characteristics. We also prototyped a basic server structure to allow the sqlite database to connect to the web application. This sqlite database holds all the information extracted by the CNNs and will be available to the user via the table view in the web application.

Split Dataset: Our chosen dataset for training the vehicle make detection model was previously split. This allowed us to put more effort into the construction of our model. The pre-split dataset was useful in ensuring that the data was good and well constructed.

Create Vehicle Make Recognition Model: We decided to use a different architecture for this neural network than we have for the previous models. Rather than using a MiniVGG

architecture we are using YoloV8m to construct this model, through the use of this architecture we have created a model that has 295 layers. The results that we are seeing have been promising and we are able to gather useful information from the images through the use of bounding boxes. Our model is capable of determining the make of a vehicle based on the badge.

Hyper-parameter Tuning: In an effort to increase the performance of our model, we tried various parameters as a way to increase the efficiency and performance of the model. Considering that the idea would be to introduce this technology to market, we want to ensure the accuracy of its performance.

Data Preprocessing: We are utilizing a public dataset that we found online, to ensure that it meets our requirements we searched through all of the images in the dataset verifying that it fulfills our needs. We determined that our chosen dataset is sufficient including the images that it contained in our train, test, and validation samples.

Sprint Planning: As we have been utilizing the Agile Software Development process, we take advantage of the beginning of each milestone to lay out our individual tasks. This continues to prove to be useful for us allowing us to effectively divide up the work that needs to be done and address any sorts of issues that may emerge.

Milestone Evaluation: Our Milestone Evaluation serves as a reflection point for each sprint that we perform. We look back on the work that we completed and it allows us to determine what else needs to be done going forward. We feel as though we are making good progress as the design showcase grows nearer. This semester is going to be busier than our previous, however, we are nearly done with the implementation of our CNNs. A large portion going forward is going to be focusing on our user experience.

2.2 Member Contribution

Remington Greko: Worked on the architecture of the web application and the databases necessary for storing data extracted from the CNN's. I also worked on the implementation of the web application. This included basic front-end implementation and some prototypes for server functionality. I also utilized Material UI, a React library, to build a table structure to allow the user to more easily view all detected vehicles. I also contributed to the database and web application discussion sections on the milestone 4 document.

Spencer Hirsch: This milestone I participated in training the vehicle make recognition model. We have gained access to AI Panther and are attempting to utilize its resources to quickly train our models in an effort to increase our results through the use of additional parameters. In addition to this I participated in the sprint planning and the completion of the Milestone 4 Evaluation document.

Thomas Johnson: This milestone I populated testing database with two tables using the python library Faker. The first table car data has six attributes, an id being stored as an int, color, body, make, license, all being stored as strings, and lastly image which will store a link to where an image will be stored. The second table is the query list which storing the same information, but instead of an image its a timer for how often the query should be

checked against the car data table. Lastly I created a front end mock up to prototype how users will be using the site.

Alexis Nagle: During this milestone I worked on creating and training the vehicle make recognition model. To do so I did some further research into ultralytics YOLO models and decided those would be the best model type to move forward with into training. In addition to this I participated in the sprint planning and the completion of the Milestone 4 Evaluation document.

3 Milestone 5 Plan

3.1 Milestone 5 Task Matrix

Task	Remington	Spencer	Thomas	Alexis
Construct Web Application	50%	0%	50%	0%
Implement License Plate Recognition Model	0%	50%	0%	50%
Hyper-parameter tuning	0%	50%	0%	50%
Data preprocessing	0%	50%	0%	50%
Implement Video Processing	0%	50%	0%	50%
Split Dataset	0%	50%	0%	50%
Create Poster and Ebook for Senior Design Showcase	25%	25%	25%	25%
Sprint Planning	25%	25%	25%	25%
Milestone Evaluation	25%	25%	25%	25%

4 Discussion - Milestone 5

4.1 Milestone 5 Tasks

Construct Web Application: Continue constructing web application for user to interact with.

Implement License Plate Recognition Model: For this milestone we are creating two separate neural networks to identify license plates as well as read the license plate data. We have found two datasets on RoboFlow that we believe will be sufficient in training our models.

Hyper-parameter Tuning: As with all of our previous neural networks we will be performing hyper-parameter tuning on the models to ensure the best performance that we can

receive. This has proven to be useful over the past models and gives us better results than what we were able to produce originally.

Data Preprocessing: Before training our models we must ensure that our selected data will produce the outcome that we expect. This requires that we must view the contents of our training data to make sure that it fits our predefined criteria.

Implement Video Processing: As we want our models to work with a constant live stream of data, this milestone we need to implement video processing. This will require us to constantly extract the vehicles from a frame and process them with our models to verify if any of them are vehicles that we are searching for.

Split Dataset: Before training a model, we need to ensure the data is split between train, test, and validation sets.

Create Poster and Ebook for Senior Design Showcase: Create both the poster and Ebook for the senior design showcase. Ensure that both items follow criteria listed on Dr. Chan's website.

Sprint Planning: As we have for all of the previous milestones we will perform a sprint planning immediately following the submission of Milestone 4. During this time we will divide up our work and provide additional time and resources towards things that we expect to be more difficult.

Milestone 5 Evaluation: Towards the end of the Milestone we will work on our Milestone 5 document and presentation. This allows us to review our work over the course of the Milestone and prepare for our next Milestone as well.

5 Client

5.1 Meeting Date

Date: February, 14 2023

5.2 Client Feedback

Create Database: Our client seemed pleased with the progress that we have made on the backend.

Create Web Applications: Our client is excited to hear about our progress on the web application and the user experience going forward.

Split Dataset: Our client was not concerned with the way in which our dataset was split.

Create Vehicle Make Recognition Model: Our client was very please with the progress that we made during the course of this milestone. He seems very excited about what we have done and is looking forward to seeing our finished product.

Hyper-parameter Tuning: Our client did not seem too concerned with the performance of our model.

Data Preprocessing: Our client did not have any issues with our dataset that we selected.

Sprint Planning: Our client feels as though we seem like we are managing our work load very well.

Milestone Evaluation: Our client was very pleased with the progress that we made for this milestone. He is very excited about our finished product.

6 Faculty Advisor

6.1 Meeting Date

Date: February, 14 2023

6.2 Advisor Feedback

Create Database: Showed Dr. Silaghi our ER Diagram and received feedback on its contents. Need to make some revisions to our ER diagram before finalizing database construction. Commented on some relational issues and raised some concerns with elements contained within database.

Create Web Applications: We did not have a demo prepared for the faculty meeting, no comments were made with regards to the construction of our web application.

Split Dataset: Was not concerned with the way our dataset was split.

Create Vehicle Make Recognition Model: Demonstrated model output to Dr. Silaghi, some concerns were raised with regards to the size of our model. There are 295 layers in our CNN, there is concern that the dataset that we are using is not large enough to support the construction of a model of this size.

Hyper-parameter Tuning: No comments were made with regards to our hyper-parameter tuning of the model.

Data Preprocessing: No comments were made with regards to our data preprocessing.

Sprint Planning: During our last meeting Dr. Silaghi made a few comments about dividing up the work for this milestone. During this meeting no concern was expressed with the tasks that we assigned for this milestone.

Milestone Evaluation: Made a few comments about making some additions to our Milestone Evaluation document, primarily adding more information about the model.

Faculty Advisor Signature: _____ Date: _____

6.3 Student Evaluation

Remington Greko	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Spencer Hirsch	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Thomas Johnson	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Alexis Nagle	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

Faculty Advisor Signature: _____ Date: _____