

Using computer vision to automate traffic surveys

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The problem

Traffic Surveys



We monitor traffic flows across the county to inform upcoming traffic calming schemes.



We have a programme of traffic counting that takes place over the year, with 200 automatic counting sites and over 60 manual counting sites.



Sometimes we need to perform ad-hoc surveys, to measure queueing traffic length, types of vehicles in congestion and turning counts at junctions.

Counting methods

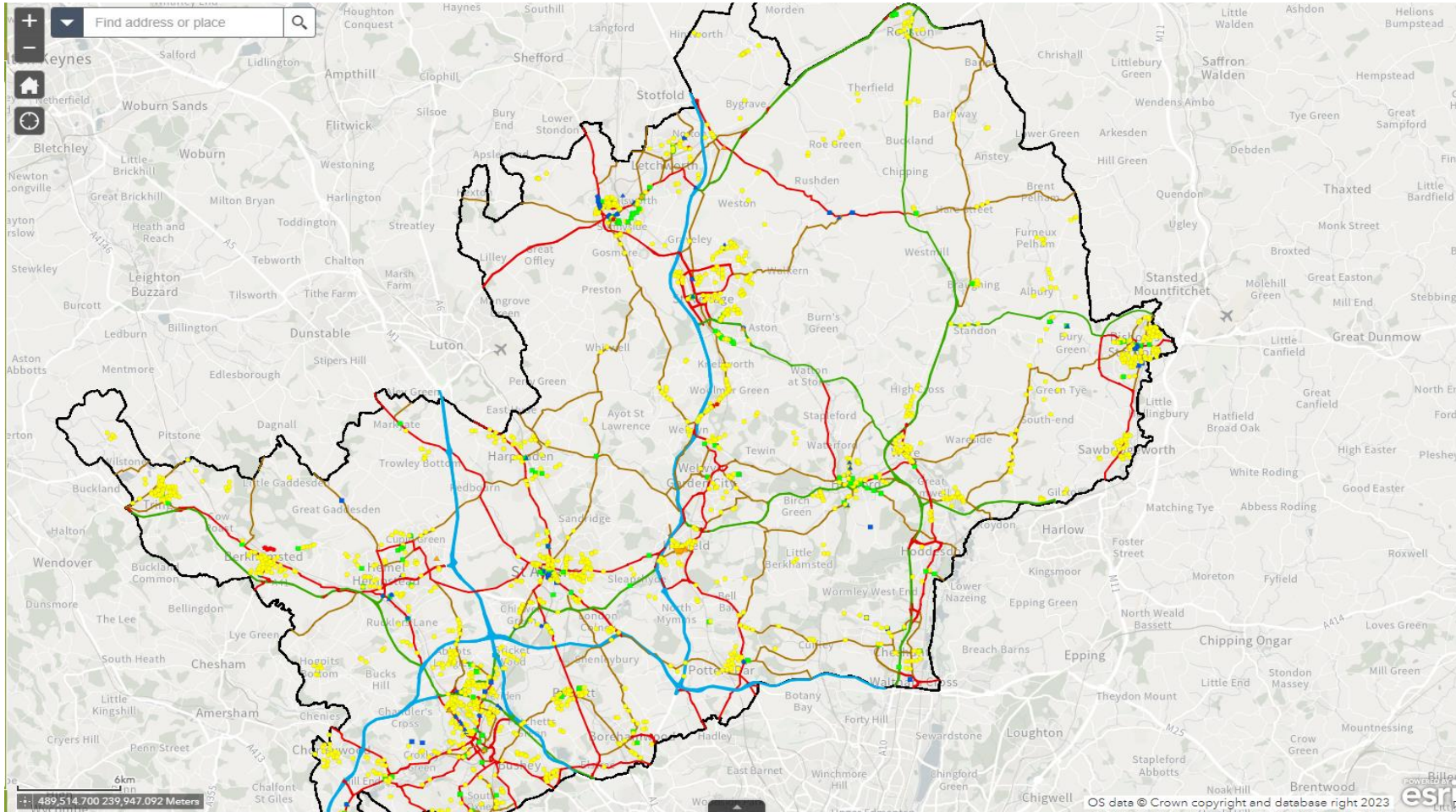


Automatic traffic counters- these are pneumatic tubes installed in the road. These classify vehicles into groups based on the pressure change of air in the tube as a vehicle rolls over them.



Manual Counting- An enumerator goes to site and either manually counts the vehicles by type and direction or records video to count them manually later. These are useful for 'ad-hoc' surveys for schemes that need to be counted.

The scale of the task



Creating a cleaner, greener, healthier Hertfordshire

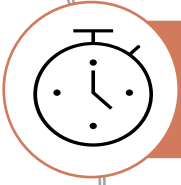
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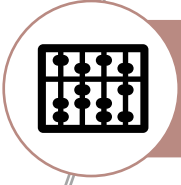
Pain points



Risk of being close to roadside.



Time spent counting.



Time spent calculating results.



Updating and maintaining database of survey results going back 25+ years.



The solution

Creating a cleaner, greener, healthier Hertfordshire

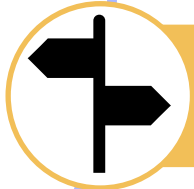
Project objectives



Can we capture all the vehicles?



Can we identify all the vehicles correctly?

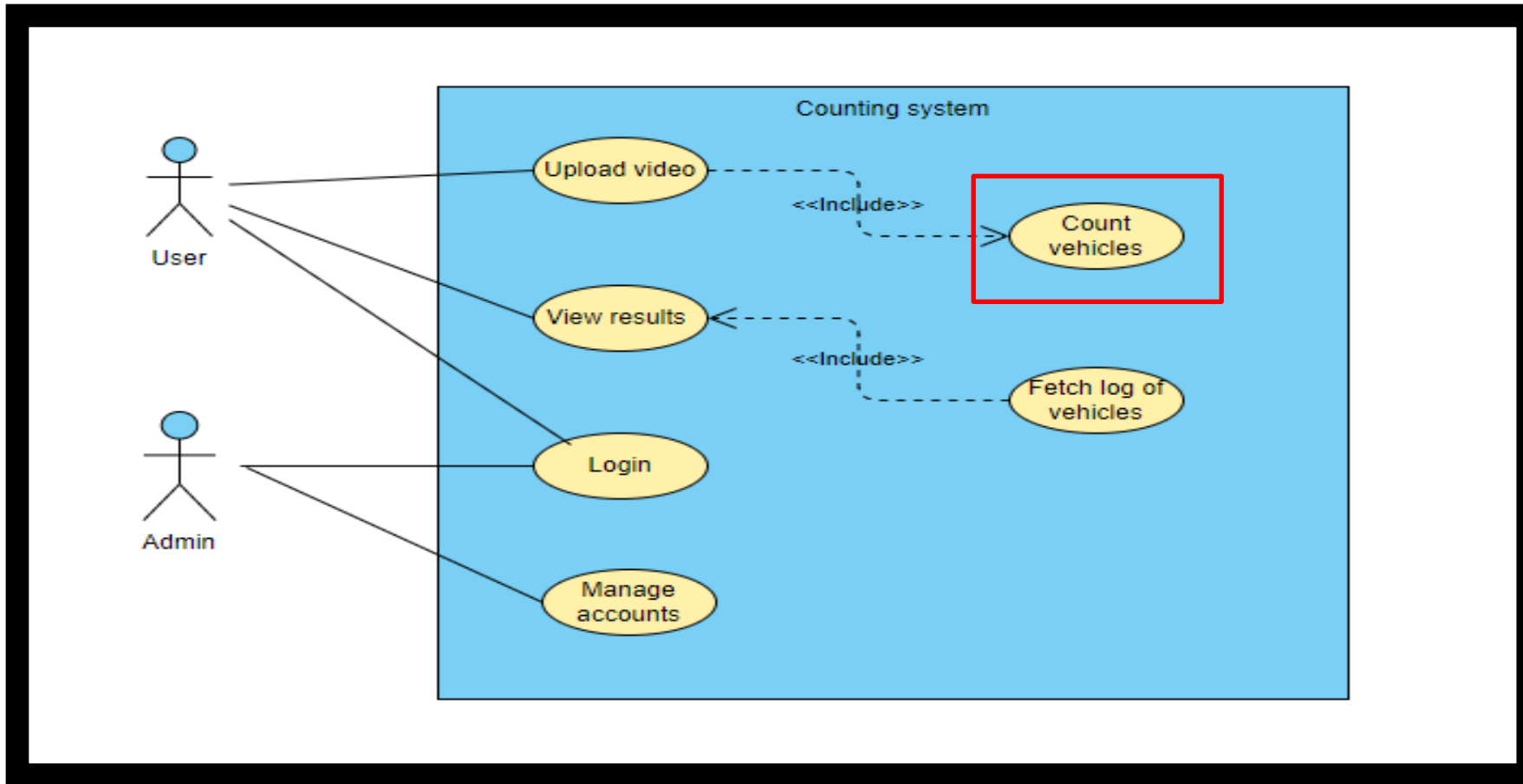


Can we identify the directions correctly?



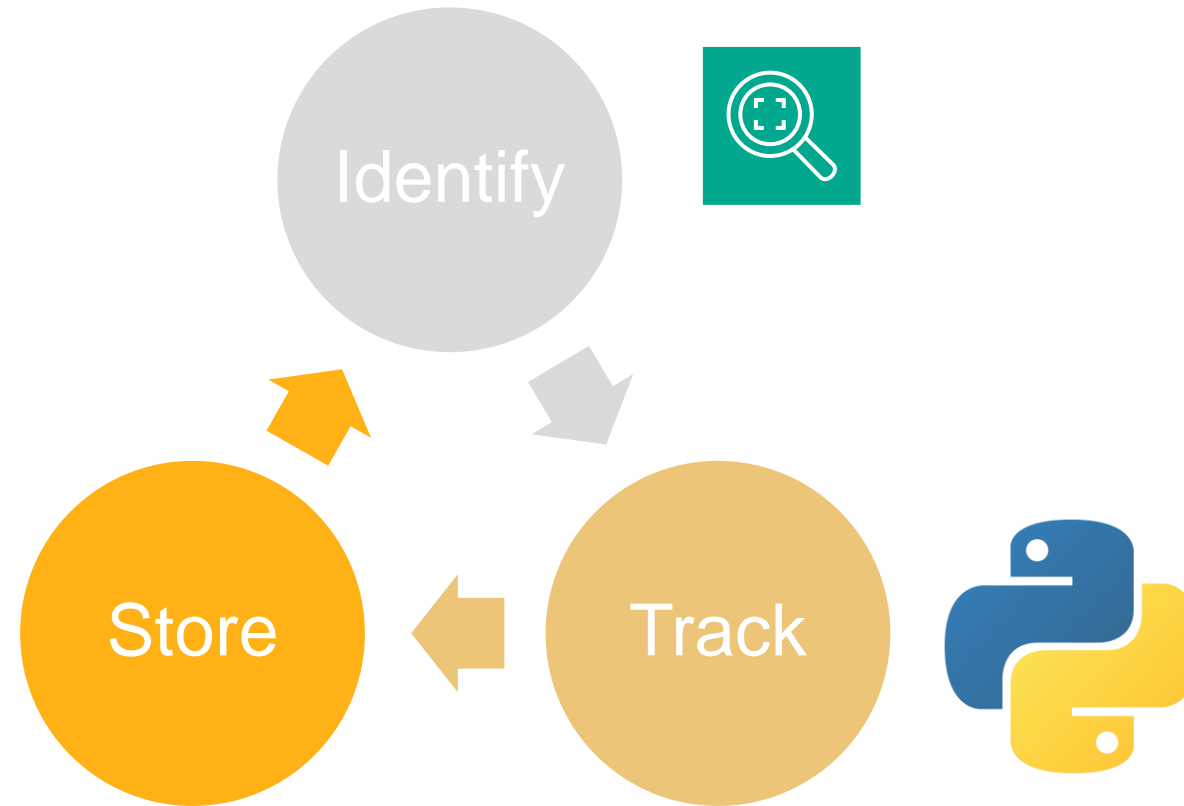
Can we make this tool available to the staff that need it?

Use case

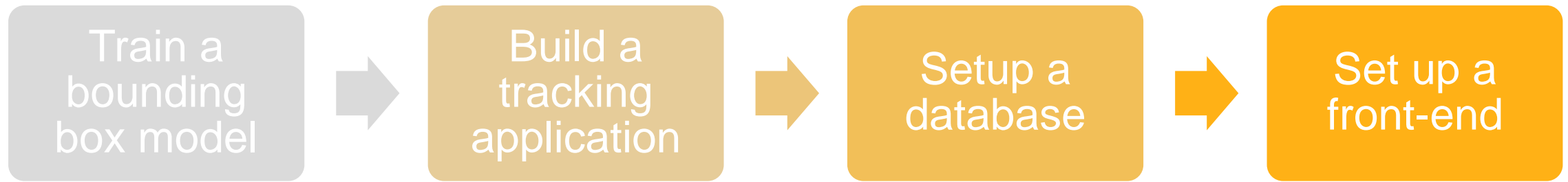


Counting the vehicles

For each frame



Project steps



Labelling



Demonstration



Website setup

Completed Refresh

Search



Thu Aug 10 13:35:59 2023 | Completed

Hertford_1691674559330_DJI_20230810143448_0002_V.MP4

Results

Thu Aug 10 13:34:49 2023 | Completed

Hertford_1691674489060_DJI_20230810142748_0001_V.MP4

Results

Completed

Hertford_1679593045247_TLC00002.mp4

Results

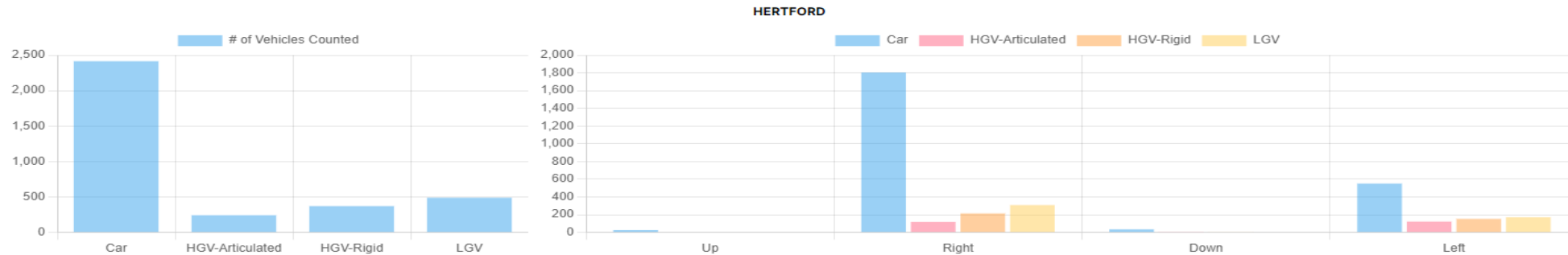
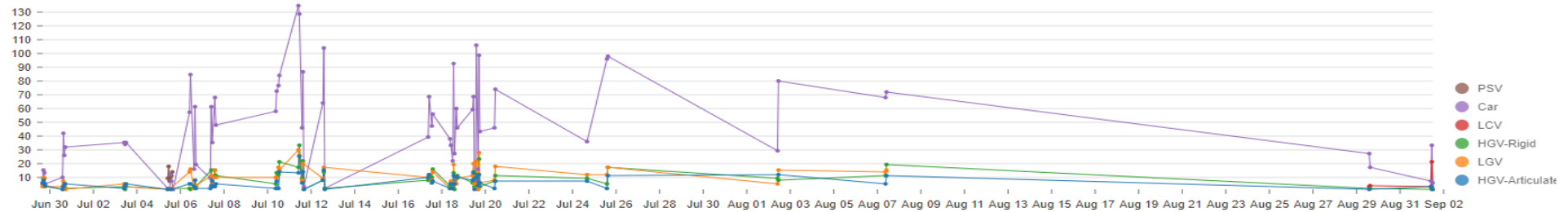
Wed Jul 19 09:21:42 2023 | Completed

Hertford_1689758502677_TLC00004.mp4

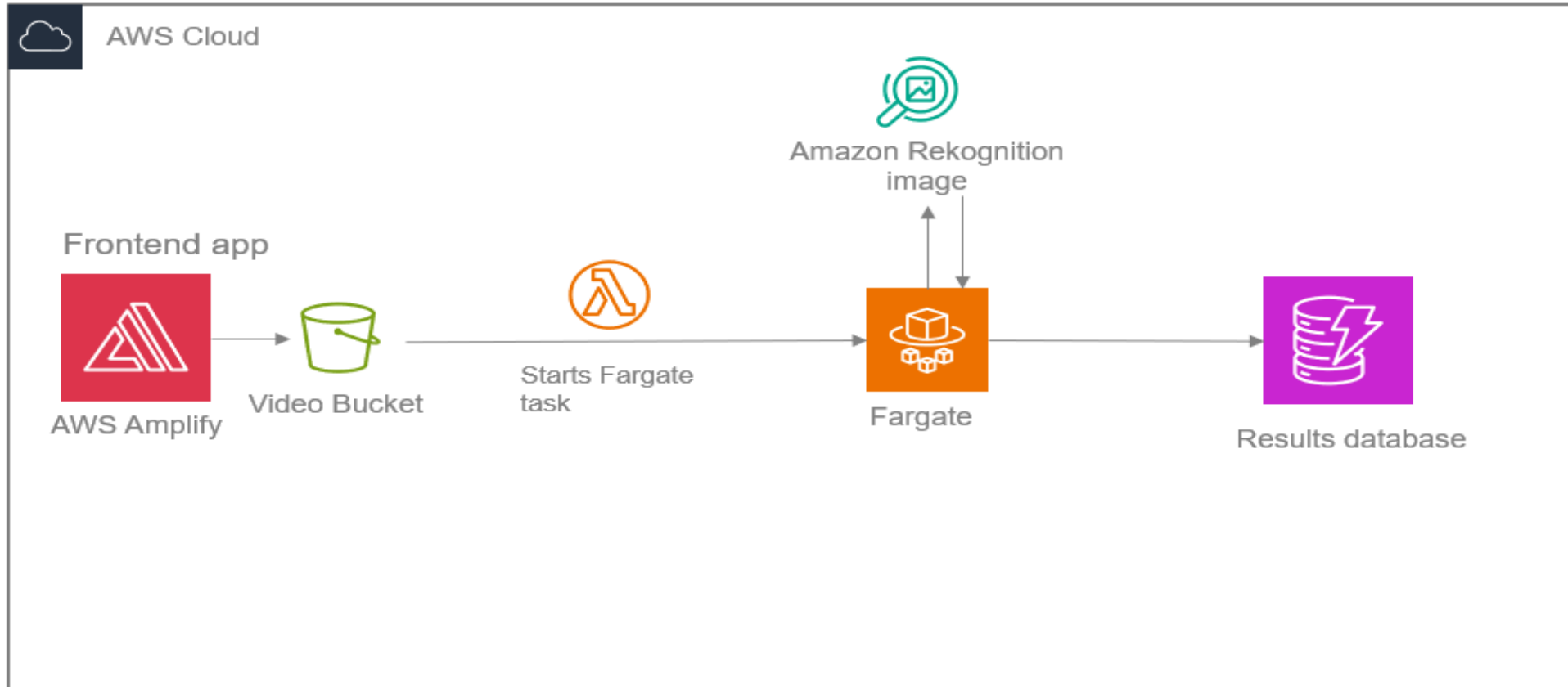
Results



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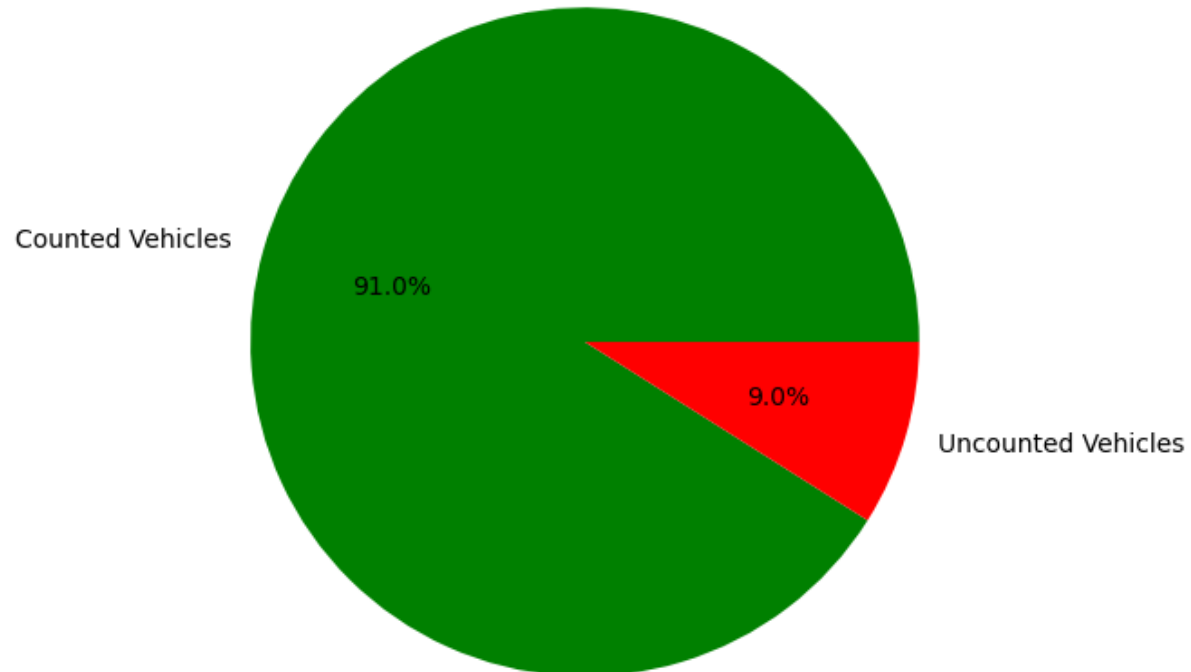


Solution Architecture



Results

Proportion of vehicles captured by application versus human enumerator



Results

- So, with 800 images of vehicles trained using transfer learning with AWS label's model.

vehicle	Application Counted	Human Counted	Percentage identified by application (%)
Car	1464	1781	82.20101067
HGV-Articulated	175	68	257.3529412
HGV-Rigid	250	122	204.9180328
LGV	306	418	73.20574163



Benefits

How did using AI benefit Hertfordshire residents

Benefits



Efficiency-processed video from a 10-hour survey in 2 hours.



Privacy-only the log of types of vehicles detected was kept

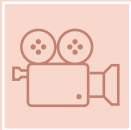


Standardization-all surveys are now done in the same manner using the same approach.

Costs



The cost of 1 human survey costs £500.



To run one survey with one camera in two lanes through the machine costs. £400



That is an 20% saving, in the cost of survey.

Takeaways



Experiment with your ideas.



Ask for help.



Break the problem down into SMART goals.



Hertfordshire

Creating a cleaner, greener,
healthier Hertfordshire