AVision

WHEN SECONDS MATTER

THE PROBLEM

- Traffic congestion is a major issue in many cities, costing billions in lost productivity. For emergency vehicles, congestion can mean the difference between life and death.
- Every day in India, **24,012 patients** die due to delay in getting medical help as ambulances are delayed due to traffic, and they are medically ill-equipped to help the critical patients.
- New smart solutions are desperately needed.

THE SOLUTION

1 **Emergency vehicle detection** Detects emergency vehicles and optimizes traffic lights to reduce delays and improve transportation efficiency.

2 **Real-time data optimization** Uses real-time data to optimize traffic control, allowing for faster emergency response times.

3 **AI-powered system** Continually learns and adapts to changing traffic conditions, ensuring a scalable and adaptable solution.

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OUR PROJECTS

Audio classification model

Trained a CNN for audio classification, achieving an accuracy of 99.17%

Trained a LSTM for audio classification, achieving an accuracy of 100%

Computer vision model

ResNet-152-based deep learning model trained to classify images of emergency vehicles. It goes through two stages of training, first with a frozen model and then with fine-tuning,

AUDIO CLASSIFICATION MODEL

LSTM

Training

```
Epoch 1/1000
8/8 [==============================] - 3s 89ms/step - loss: 0.6391 - acc: 0.6062 - val_loss: 0.4872 - val_acc: 0.8667

Epoch 00001: val_acc improved from -inf to 0.86667, saving model to best_model.hdf5
Epoch 2/1000
8/8 [==============================] - 0s 10ms/step - loss: 0.4739 - acc: 0.8188 - val_loss: 0.3631 - val_acc: 0.9000

Epoch 00002: val_acc improved from 0.86667 to 0.90000, saving model to best_model.hdf5
Epoch 3/1000
8/8 [==============================] - 0s 10ms/step - loss: 0.3617 - acc: 0.8646 - val_loss: 0.2663 - val_acc: 0.9167

Epoch 00003: val_acc improved from 0.90000 to 0.91667, saving model to best_model.hdf5
Epoch 4/1000
8/8 [==============================] - 0s 10ms/step - loss: 0.2782 - acc: 0.9021 - val_loss: 0.1931 - val_acc: 0.9333

Epoch 00004: val_acc improved from 0.91667 to 0.93333, saving model to best_model.hdf5
Epoch 5/1000
8/8 [==============================] - 0s 10ms/step - loss: 0.2170 - acc: 0.9167 - val_loss: 0.1489 - val_acc: 0.9417

Epoch 00005: val_acc improved from 0.93333 to 0.94167, saving model to best_model.hdf5
Epoch 6/1000
```

Confusion Matrix
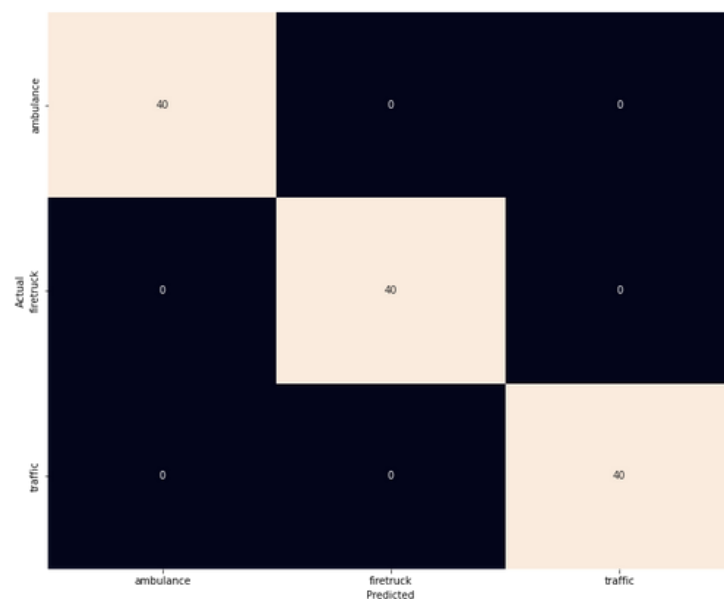
Accuracy: 100.00%

CNN

Training

```
Epoch 1/200
8/8 [==============================] - 1s 49ms/step - loss: 2.3234 - acc: 0.3333 - val_loss: 0.8274 - val_acc: 0.3250
Epoch 2/200
8/8 [==============================] - 0s 10ms/step - loss: 0.7903 - acc: 0.5104 - val_loss: 0.7158 - val_acc: 0.5917
Epoch 3/200
8/8 [==============================] - 0s 11ms/step - loss: 0.5469 - acc: 0.6729 - val_loss: 0.4001 - val_acc: 0.7583
Epoch 4/200
8/8 [==============================] - 0s 10ms/step - loss: 0.3772 - acc: 0.7833 - val_loss: 0.3406 - val_acc: 0.7917
Epoch 5/200
8/8 [==============================] - 0s 10ms/step - loss: 0.3098 - acc: 0.8229 - val_loss: 0.3055 - val_acc: 0.8083
Epoch 6/200
8/8 [==============================] - 0s 11ms/step - loss: 0.2858 - acc: 0.8458 - val_loss: 0.2785 - val_acc: 0.8083
Epoch 7/200
8/8 [==============================] - 0s 11ms/step - loss: 0.2602 - acc: 0.8625 - val_loss: 0.2597 - val_acc: 0.8333
```

Confusion Matrix
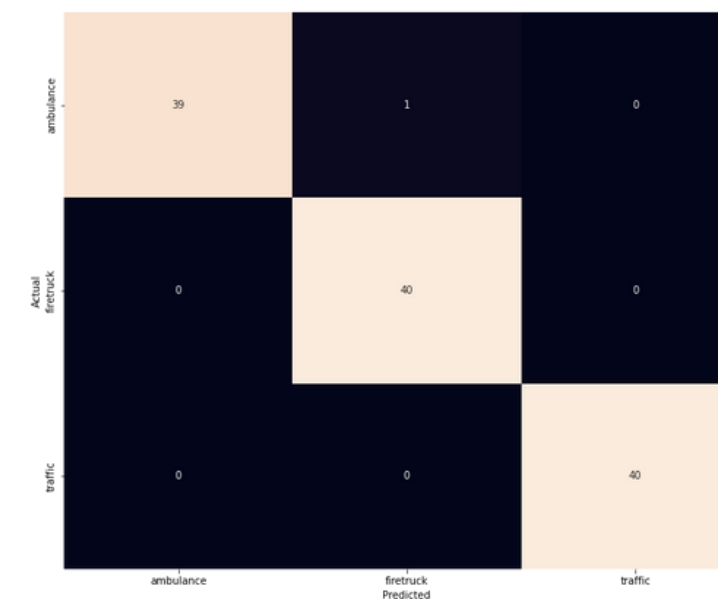
Accuracy: 99.17%

Dataset

https://research.google.com/audioset/dataset/emergency_vehicle.html

COMPUTER VISION MODEL

Training

epoch	train_loss	valid_loss	accuracy	time
0	0.477125	0.283500	0.927007	00:19
1	0.334837	0.360468	0.924574	00:16
2	0.279804	0.330274	0.927007	00:16
3	0.223465	0.244293	0.948905	00:16
4	0.170902	0.220495	0.951338	00:15
5	0.137611	0.219924	0.944039	00:16
6	0.110867	0.230981	0.939173	00:15
7	0.089022	0.202738	0.948905	00:16
8	0.074998	0.194852	0.946472	00:16
9	0.062235	0.192458	0.948905	00:16

Confusion Matrix
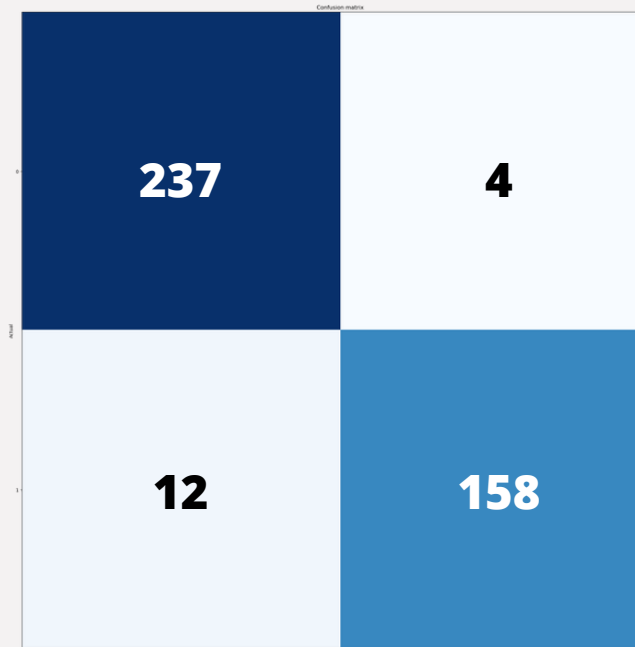
Statistics

Measure	Value
Sensitivity	0.9579
Specificity	0.9753
Precision	0.9856
Negative Predictive Value	0.9294
False Positive Rate	0.0247
False Discovery Rate	0.0144
False Negative Rate	0.0421
Accuracy	0.9642
F1 Score	0.9715
Matthews Correlation Coefficient	0.9240

Dataset
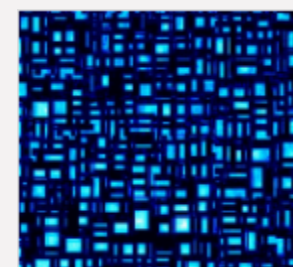
Emergency Vehicles Identification

Emergency vs Non-Emergency Vehicle Classification

k kaggle.com

IMPACT

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1 Cut maximum emergency trip delay during high congestion by 30-45%, increasing survival rates for critical injuries

2 Scalable and reliable solution tailored to optimize traffic flow improving productivity and reduces congestion-related accidents.

A VISION FOR THE FUTURE