

INTERNET OF THINGS (IoT) BASED INTELLIGENT TRAFFIC MANAGEMENT SYSTEM

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Abstract

To keep traffic running more smoothly, a smart traffic management system based on sensor data, connectivity, and automated algorithms is being developed. The aim is to monitor the time of a green or red light for a given traffic light at an intersection as efficiently as possible. The traffic lights do not all flash the same shade of green or red, but should vary depending on the number of cars on the road. When there is heavy traffic in one direction, the green lights should remain on longer; when there is fewer traffic, the red lights should stay on for a longer period of time. This approach is supposed to reduce inefficiencies at intersections while also lowering commuting costs and emissions levels. Our aim is to develop a system based on IoT for traffic management, so it can real-time define traffic on the road.

Introduction

In 2014, urban dwellers made up 54 percent of the global population. The forecast was for annual growth of approximately 2% until 2020, putting more strain on cities' transit systems. Furthermore, the high cost of housing in business districts causes urban workers to live far away from their places of employment/education, requiring them to move back and forth between their homes and places of work. A fixed number of highways and highway networks must be able to handle more traffic traveling. When faced with increased traffic, it's common practice to simply enlarge roads or raise road levels. Cities, on the other hand, should focus on making their streets run more efficiently rather than just expanding them or adding more avenues. This leads to the proposed system, which would measure the number of vehicles using a microcontroller and sensors, allowing for time-based monitoring of the system.

One of the most significant transport challenges facing developed countries today is traffic control. Developed countries and smart cities are now using IoT to their benefit in order to reduce traffic congestion.

Citizens in all kinds of countries have quickly cultivated an automotive culture. People in most cities tend to drive their own cars, regardless of how decent or poor public transit is or how much time and money it would take to get to their destination.

Existing System

The modern traffic grid is largely under the jurisdiction of traffic cops. The biggest disadvantage of this traffic police-controlled scheme is that it is not intelligent enough to cope with traffic congestion. The traffic police officer can either block a road for more time or allow cars on another road to drive by, implying that the decision-making process might not be as wise as it seems, as it is completely dependent on the officer's decision.

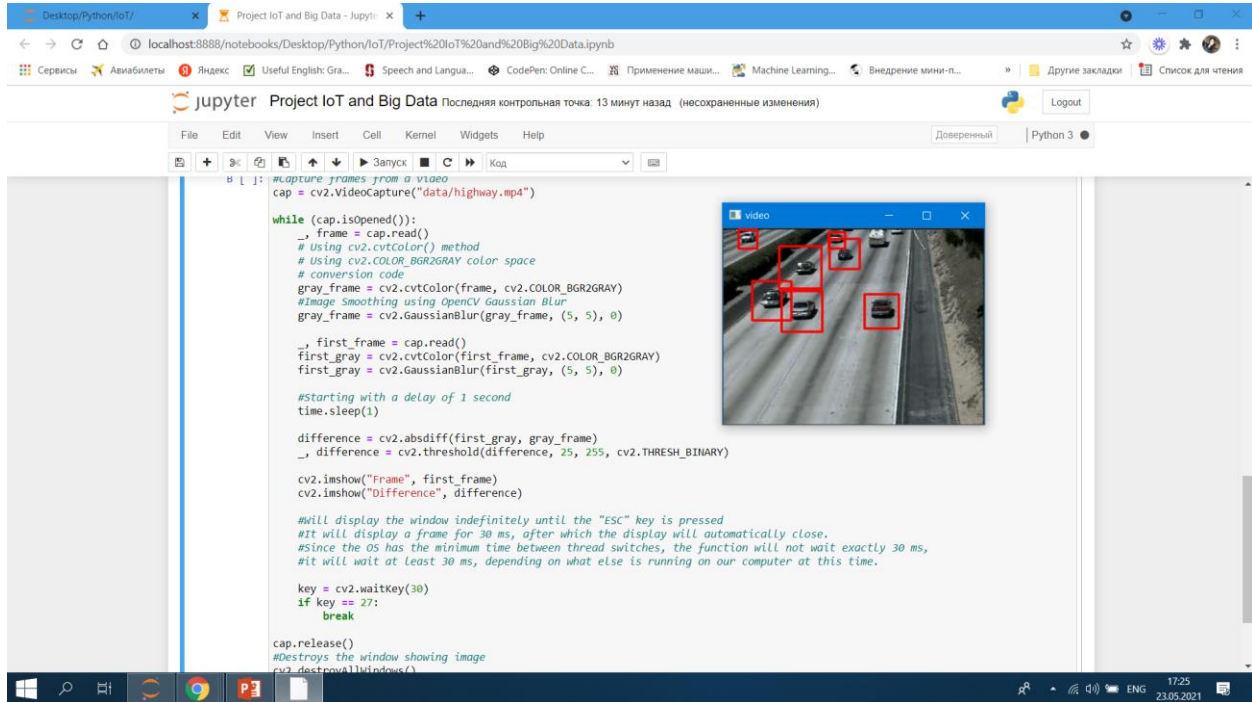
Disadvantages of Existing System:

- 1) Traffic congestion
- 2) No means to detect traffic congestion

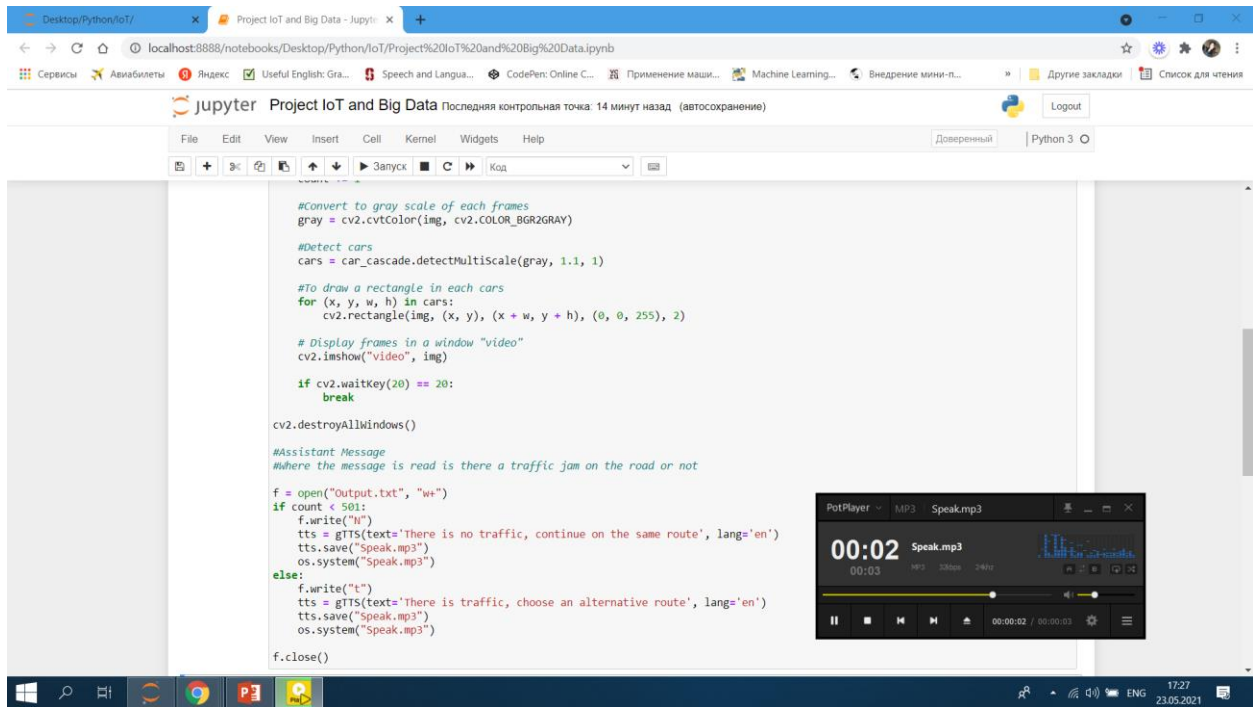
- 3) Number of accidents are more
- 4) It cannot be remotely controlled
- 5) It requires more manpower
- 6) It is less economical

Proposed System

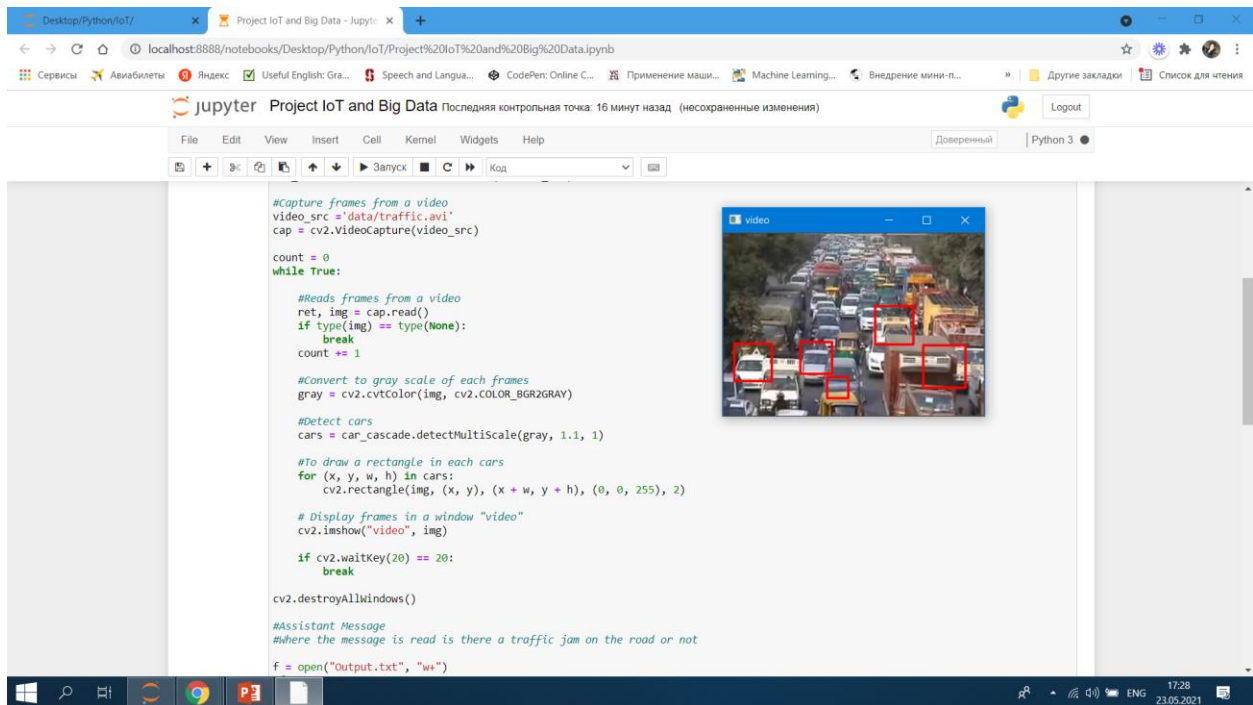
We propose a system which can real-time define traffic on the road. For that purpose we use CV methods and as a dataset we use real videos of the road. With the help of trained XML classifiers, which describe some features of the cars, we define the cars in the frame:



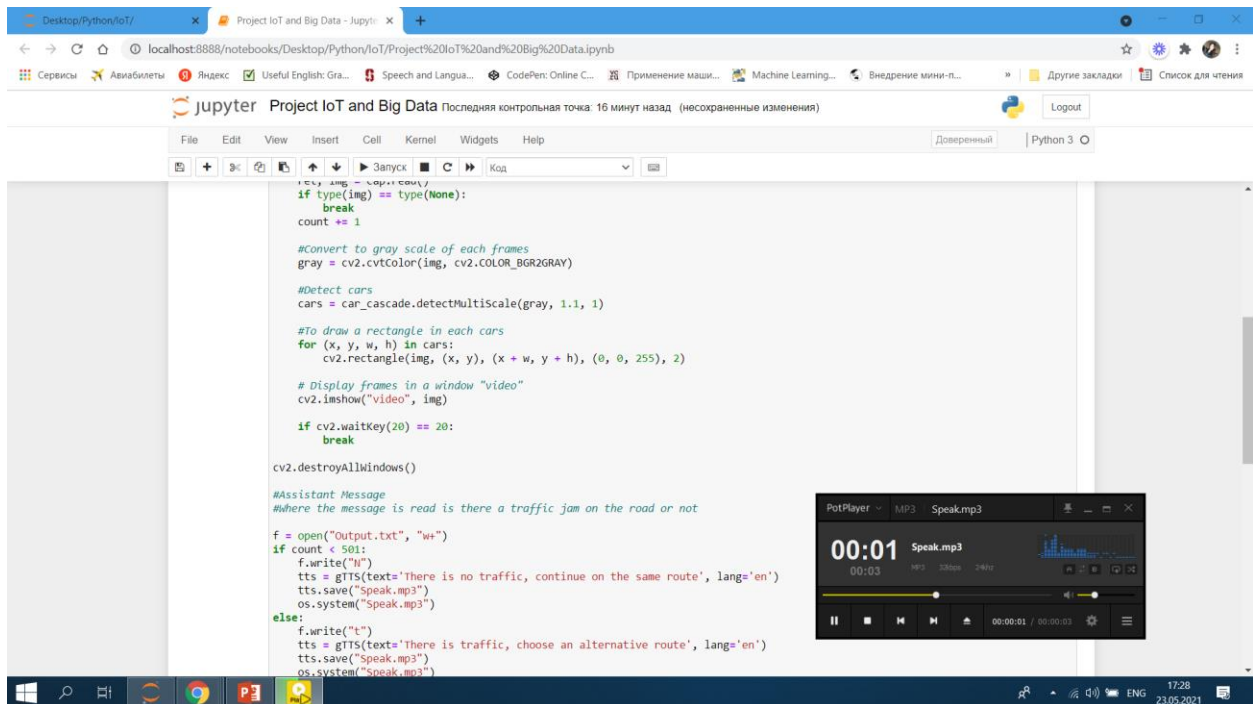
Then, as the viewing of the record ends, we display a message about the traffic. The information message about the traffic is output in the form of an audio assistant. In this record, the following message is voiced:: "There is no traffic, continue on the same route".



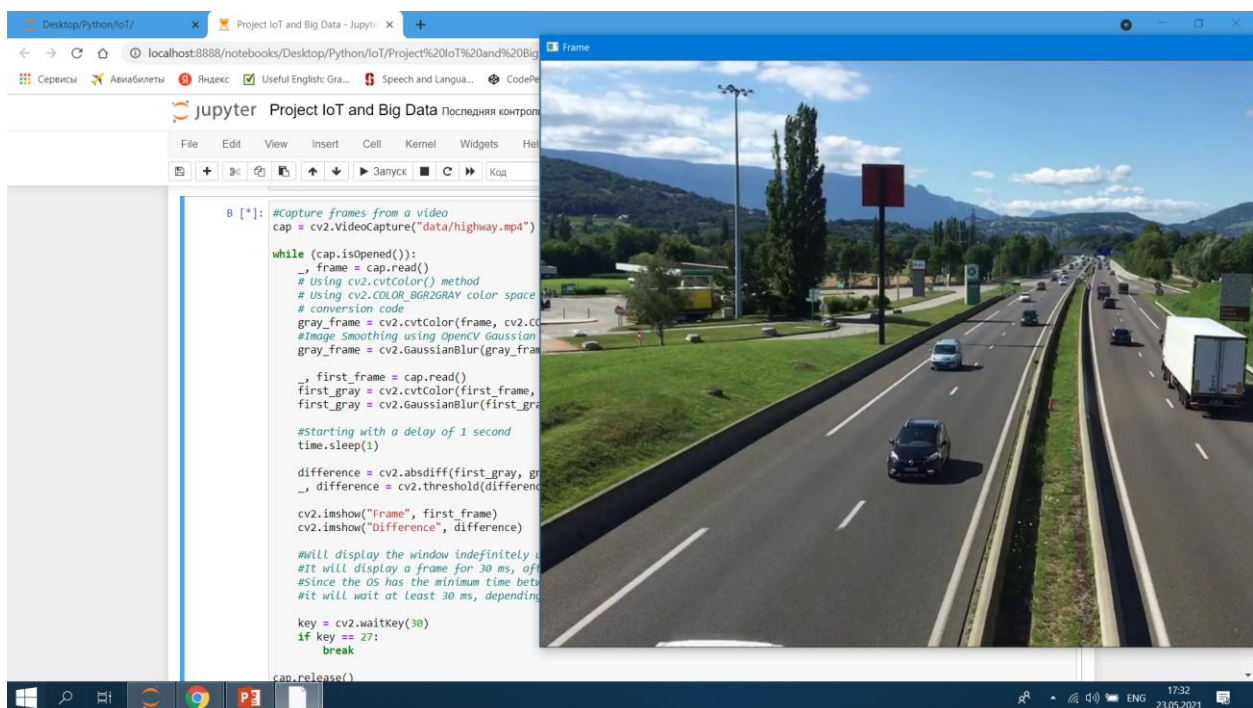
In this example, we are looking at another video where there is a traffic.

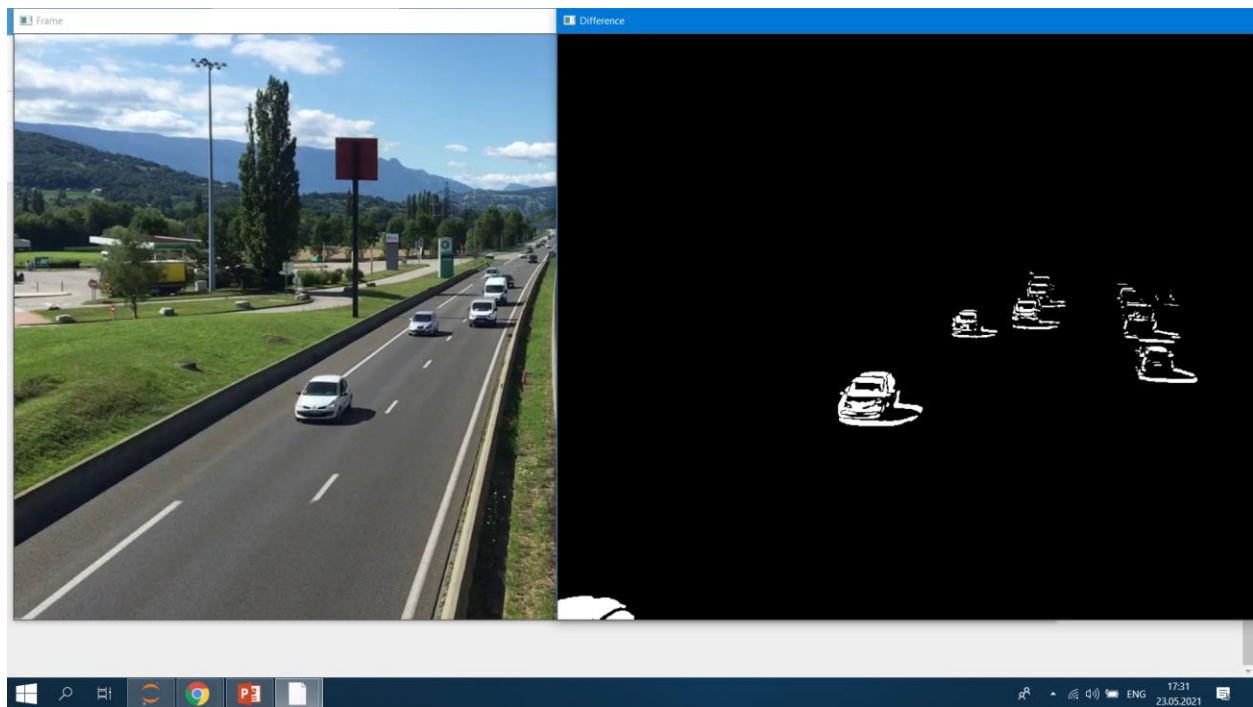
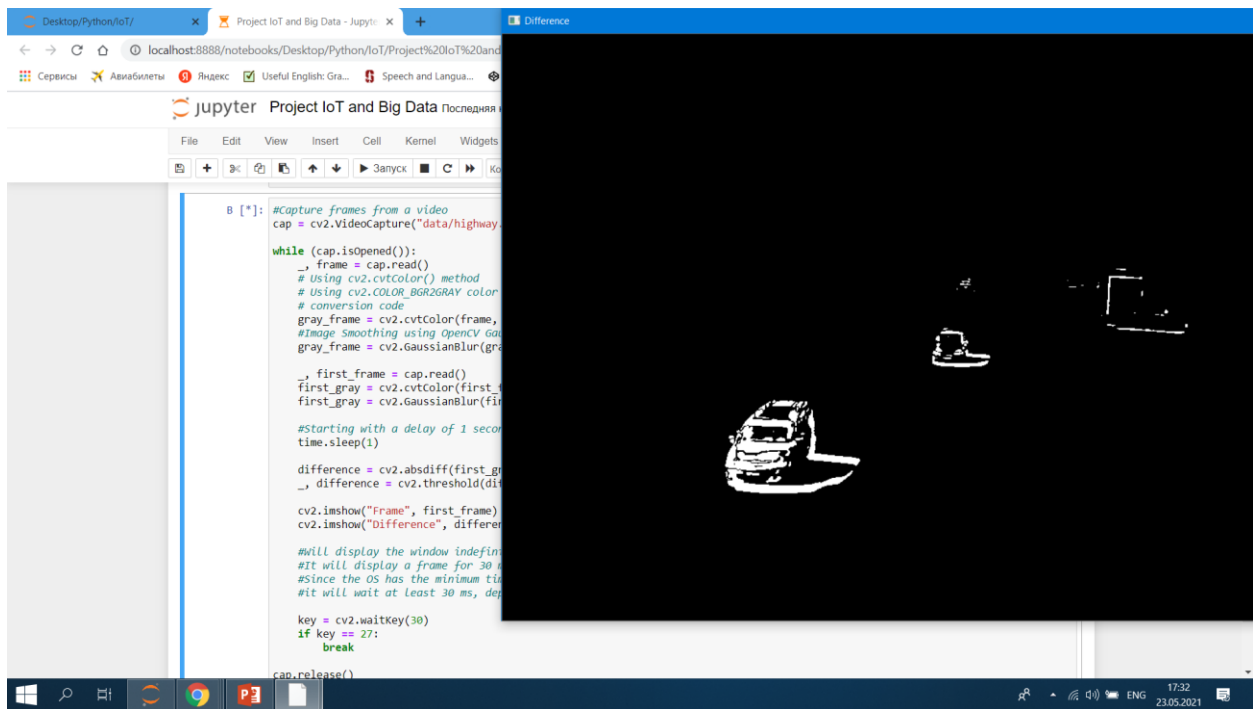


The voice assistant voices this message: "There is traffic, choose an alternative route".



Also additionally, we decided to find the absolute difference between the background and the current frame, and it looks like this:





The results of determining the traffic and displaying information about it

Future Scope

For future directions, different priority levels for multiple incidents and scenarios can be considered. The main issue with IoT is that the security of the entire system has to be concentrated on and not a particular IoT layer, device or software. Hence, integrating the entire traffic management system with multiple layer security for various data generated from various sources can be another subject of future scope. Along with that an emergency signal for an emergency vehicle (such as an Ambulance) can also be included in order to serve them better.

Conclusion

Traffic optimization is achieved using the IoT platform for efficient utilizing allocating varying time to all traffic signals according to available vehicles count in the road path. Smart Traffic Management System is implemented to deal efficiently with the problem of congestion and perform rerouting at intersections on a road.

For traffic management: collecting, storing, aggregating and analyzing traffic information in real time can solve many problems, as well as optimize routes for travelers or tourists. This can be done by enabling sensors and actuators in cars, buses, and other vehicles that have the ability to process information about the flow of cars on one of the streets or avenues from centralized cameras. After which drivers or managers can decide to avoid obstacles.

The resource code could be found in: <https://github.com/Kabdygaliyeva/IoT-and-Big-Data>

Bibliography

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