

# Automate Parking Appeal Process using historical data

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## I. Executive summary

Respond time for parking penalty appeals process is very challenging for many car owners, As the driver should expect a response within 14 days from his appeal, many drivers wish to seek response earlier so that they can avoid additional charges or retrieve a car if towed/clamped.

The project objective is to reduce the response time taken by the routine appeals process, by applying data science techniques to build a machine learning system to automate the processing of routine appeals using historical data.

## II. High-level description and objectives of the use case

Time taken by the process of appeals is major problem for many drivers, many drivers are interesting in quick response for their appeals in order to take the right action for their cars if its towed or clamped.

Observing penalty charge notices issued by civil enforcement officers on street and those issued by civil enforcement officers via CCTV can facilitate to solve this problem.

In this project we are trying to utilize the historical data of penalty charge notices (PNC) to build a system to automate the process of appeals. when a driver submits an appeal, the system can decide to accept it or make no decision and let the city agent handle it.

Based on this analysis, the driver will be able to receive respond to his appeal early accordingly he could plan for further action. In addition, the city could predict the reason why appeals taken in certain locations are always valid, so could take corrective action and reduce the agent workload.

### III. Challenges address by the use case

- Respond time for parking penalty appeals process is a major problem for many drivers.
- The city/government is particularly interested to know where is the location of the most accepted appeals? (may be the camera has an error and need maintenance).
- The city needs to save money by reducing the agent workload if the hourly wage of the agent is high.

### IV. Data Sources

The dataset contains transactional penalty charge notice data held in the London Borough of Camden's parking management system, inclusive of penalty charge notices issued by Civil Enforcement Officers on street and those issued by Civil Enforcement Officers via CCTV. Attribution includes contravention code, ticket type, street, parking restriction, vehicle category and status of case. Where possible, the approximate location of the PCN has been captured.

Dataset Columns:

Contravention Date

Contravention In Last 7 Days

Ticket Type

Ticket Description

Contravention Code

Contravention Code Suffix

Contravention Code Description

Ticket Issued Via CCTV Camera

Controlled Parking Zone Area

Street

Vehicle Category

Vehicle Removed

Status Of Case

Charging Band Description

Civil Enforcement Officer Error

Penalty Charge Notice Cancelled

Penalty Charge Notice Written Off

Cancellation Reason

Foreign Vehicle

Country Vehicle Registered To

Has Appeal

Formal Representation

Ward Code

Ward Name

Easting

Northing

Longitude

Latitude

Location

Spatial Accuracy

Last Uploaded

Socrata ID

Note:

Civil Enforcement Officer GPS Location = the GPS location reported by the CEO's handheld device  
Fixed CCTV Camera = the location of the CCTV camera, this could be many metres from the vehicle in contravention  
Unknown = No location has been captured

Data URL:

<https://data.gov.uk/dataset/248a9d69-f9cb-420f-98b7-e03121fee3bd/parking-services-penalty-charge-notices-2016-17?fbclid=IwAR12FXNbHIbbiRWEq4hm-iRUfrrtdeET-GswG6PSLRauqA-H0oi9aZqfWeg>

## V. Modeling Approach

By exploring the data, we can build a machine learning model to learn the relationship between the change values of PCN data e.g. (street, Civil Enforcement Officer Error, Ticket Issued Via CCTV Camera , Spatial Accuracy, Cancellation Reason and location) and the change in the status of the case (paid /cancelled), it is assumed that the status of the case reflects appeal status .

As a result, the model can learn if the appeal is valid or invalid depending on the relation between the change in the values of this PNC data and the change in the status of the case.

Classification modeling algorithms could be used to predict if the appeal is accepted or not.

## VI. Overall Model Structure And Work Flow:

- Data understanding and wrangling.
- Exploratory Data Analysis.
- Feature engineering to define the needed features.
- Choosing the prediction model.
- Evaluating model accuracy and tuning the model.

## VII. Applications of the use case

- The model can be integrated in a system utilize by the city /government to automate the processing of the routine appeals.
- The model can be translated to mobile application for the drivers. [Future work]

