29-03-2017

Smart Parking in Copenhagen: Invitation to dialogue
The City of Copenhagen wishes to introduce Smart Parking solutions in the streets of Copenhagen to make better use of the existing space capacity by providing drivers in search of parking with information about the probability of finding a parking lot in the area or the nearby area of the desired destination of the individual driver at any point in time.

Our journey:
The project scope was originally focused on a hardware based solution (sensors, cameras or radar). In fact a number of Smart Parking technologies currently exist in the market including sensors embedded in the road, cameras mounted above parking spaces and radar solutions integrated in street lighting.

As the project progressed, it became evident that the current maturity of most hardware solutions is non-competitive, which eventually led to a decision to re-define the scope towards software solutions (data and algorithm) able to solve the challenges posed by Smart Parking in the specific context of Copenhagen Municipality.

Purpose:
Copenhagen Municipality is an award-winning Smart City in the forefront of addressing climate change. Copenhagen has decided to implement a large-scale solution of smart parking.

The primary objective is to effectively bring down search time (for parking spots) collectively for the drivers present in Copenhagen Municipality, and as a result reduce the amount of CO_2 emissions significantly.

Final product – an algorithm:
The final product is a service to be used by parking app and navigation providers as well as other parties.

This will provide some sort of probability map, based on a specific location and time.

To implement this service we need an algorithm which can the data.

The algorithm should be adaptive and learning.

Furthermore the algorithm should be able to provide Copenhagen with Business Intelligence on the parking situation.

Facts and Sources:
The parking areas currently in scope consists of the entire Copenhagen area with a total of 126.000 public street level parking

spaces in scope for 2017. Around 50.000 parking spaces are within the parking payment zone – painted with yellow, blue, green and red colour. (See Figure 1)

Approx. 118.000 cars are owned by citizens and approximately 530.000 cars cross the municipal borders on a normal workday between 5 and 7 pm.

The parking spots are laid out as polygons in the map: [Copenhagen Map - Parking](#)

We have some statistics on the use of the different areas based on the purchases of parking tickets:
http://data.kk.dk/dataset/parkeringstilladelser-parking-rights

Furthermore, our scanning cars will provide count of empty parking spots to further teach and check the algorithm.

The Municipality has designated many other central data sources which will be used in the Smart Parking project.
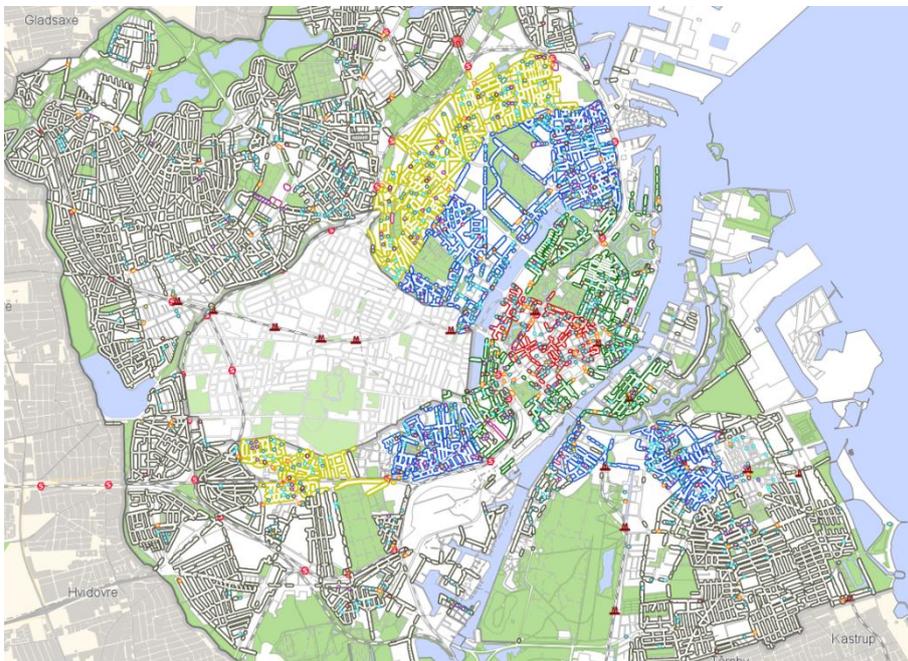

Figure 1: Parking in Copenhagen

Invitation to dialogue
We would like to invite you to a dialogue on this problem.

Some of the things we are trying to work out are:
- How would we implement such a solution?
- Which data would be critical and which nice-to-have?
- Does an Out-of-The-Box solution exist which could fit most of the demand or should we do/purchase bespoke development?

Based on the input from this dialogue we will assess the need for a formal tender.

Requirements (non-exhaustive list, be sure to consult the challenges section for a more comprehensive overview of the necessary considerations):

Process:

- If it is of interest, please send a reply with an email on the key challenges asap.
- Relevant vendors will be invited (based on feedback form answers) for meetings with Copenhagen Municipality on one of the following dates: April 3^{rd,} 4th, 18th or 19th. All meetings will be of maximum 60 min. duration and scheduled between 13.00-16.00.

Evaluators
All submitted material will only be reviewed by internal (Copenhagen Municipality) staff. Please inform us if part of the submitted material is confidential information.

Different approaches, same expected results
The Smart Parking solution should use one of three approaches as listed below:

a) Existing parking optimization algorithms
b) Green field development of parking algorithms
c) Repurposing of an existing general optimization algorithm

Knowledge transfer is key
Please consider a plan for transferring ownership from the development phase to the operational phase, and the time required of the vendor to prepare need documentation is important for the Municipality.

Key questions that must be answered via email:

1) Please provide a short description of your organisation's relation to the field of parking management (if any) or algorithms/computing?

2) Please provide short examples of products or solutions in the field of parking management or algorithms/computing provided by you?

3) Please provide a short description of the delivery process and timeline, as you see it, from examination and data collection to the service delivered and on to the learning process?

4) Please describe the elements in your solution, e.g. code, licenses, platforms and other requirements? Can the algorithm optimizing the parking be sold as a stand-alone product?

5) Please briefly describe the algorithmic steps and critical data dependencies?

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6) How proprietary is your solution? Can we customize your solution ourselves, if yes please indicate limitations.

7) Where is the processing of the data taking place geographically? Server location must be in Europe.

8) Which data sources does/can your algorithm currently use as part of the optimization process?

Instructions for replying:

- Please reply with an email on the key challenges by providing a <u>concise</u> and <u>simple</u> description of how your company and parking technology/solution is able to handle each of the challenges listed. You will have the opportunity to elaborate during the subsequent dialogue meetings.
- Please share the following information of your primary contact person: **Name, phone number and email address**.
- Please let us know if you are available for face-to-face meetings in Copenhagen or over Skype on either April 3rd, 4th,18th or 19th. All meetings will be held between 13.00 and 16.00.
- Please attach or refer to any additional informative and edited documentation about your services, products or technologies that are of relevance to your specific technology/solution or challenges listed.
- Please make sure to mention reference implementation projects you have done for clients/cities with similar challenges/needs.
- Please return your response to Lise Søderberg, Digitalization Consultant by email (<u>ak8q@tmf.kk.dk)</u> in PDF format.
- Please make sure that your response is returned to us no later than 12.04.2017. We will be inviting vendors for interviews as we receive the applications prior to the deadline. First interview is scheduled to be held at April 3rd at 13.00.

The process following your timely (vendor's) reply.

Please notice that your timely reply does not necessarily guarantee you an invitation to the subsequent dialogue meetings: We reserve the right to choose the most relevant solution providers/vendors for the continued dialogue but we aim to include as many relevant vendors as possible.

Dialogue meetings will be held in the form of a 1:1 meeting between representatives of Copenhagen Municipality and each of the vendors on one of the following dates: April 3rd, 4th, 18th or 19th 2017. In order to accommodate the interested international vendors, the dialogue meetings can be held over video conference/skype call.

You will be informed of the selection process that follows the dialogues meetings, if selected for further dialogue.