In recent years advancements in Semantic Technologies facilitated great opportunities to use IoT services in smart cities[2](#_http://www.ict-citypulse.eu/page/sites/)[1](#_:http://static.billetlugen.dk/images/ev)Due to this number of cities have started to invest on data-driven infrastructures and services for citizens. These infrastructures focused on creating and publishing rich dynamic datasets that can be used to create new services. City Pulse provides one such kind of innovative smart city applications by adopting an integrated approach to the Internet of Things and the Internet of People. This project will provide opportunity for creation and provision of reliable real-time smart city applications[3.](#_http://www.ict-citypulse.eu/page/sites/_)

This report gives a data description of City Pulse’s real-time applications for streaming IoT and social media. This will enable us to build analytics for large volume of data that can make performance of a smart city better. This project is useful to city administrators by notifying them the occurrences of specific events in which they are interested. The problems that can be solved related to city cultural events are listed below

* Number of cultural events happening closest to current location at [**5**](#_http://srvgal89.deri.ie:8080/ali_intiza)**.** This application uses data streams and integrates it with background details of cultural events to find out the closest cultural event happening near to current location.

* Find out Traffic congestion level on the road where a given cultural event is happening. Notification for congestion level should be generated every minute starting from few minutes before the event is planned, till few minutes after event end.[6](#_http://iot.ee.surrey.ac.uk:8080/dataset)This would help if any unexpected situation occurs like fire accident audience should be guided in safer way to get out of the situation

We use the datasets collected from the city of Aarhus, Denmark. This data set is about Aarhus, Denmark city cultural events data. It contains 16 attributes to explain data. This dataset collected from partner of City Pulse EUFP7 project. This data describes a set of cultural events provided as a data Stream from the municipality of Aarhus and it is semi-static. The dataset is periodically updated to the latest information related to the cultural events. Updates are available as data stream; a message notification service notify of any updates in the dataset.

In this section, we briefly describe the dataset and elaborate on the semantic representation of the datasets. As cultural data is semi dynamic it is updated periodically. The data set provided in two different formats. One is in CSV, comma separated values. The other document specifies a language that is in common usage under the name "Turtle" or TTL format. There is more information on TTL format available [9](#_https://en.wikipedia.org/wiki/TTL_1) Turtle is a format for expressing data in the Resource Description Framework data model with the syntax similar to SPARQL, RDF, it represents information using “triples” which consists of a subject, a predicate and an object. Each of these items is expressed as a Web URI. (W3C Semantic Sensor Network Incubator Group) after triple.

An example of triple is : <http://example.org/#spiderman>  
<http://www.perceive.net/schemas/relationship/enemyOf><http://example.org/#green-goblin>.

This is semantically representing the features of a stream data. The SAO ontology is a lightweight semantic model, which is built on top of models that represent IoT data streams. It has been developed within the domain of City Pulse project. The project contains four main modules, namely Stream Annotation Ontology, [Quality](https://mobcom.ecs.hs-osnabrueck.de/cp_quality/), Complex Event [7](#_http://citypulse.insight-centre.org/ont)Ontology, and [User Profiles](http://iot.ee.surrey.ac.uk/citypulse/ontologies/up/up.html) information model

There is no metadata available explain about data. By going through online Danish websites with example data provided I was able to characterize most of the data. Still there are few unknown attributes in data set. Data set is loaded as a Spark Data Frame objects using Zeppelin.

The data set contains total 16 attributes and 100 rows in dataset.The meta data is shown below.

root

|-- Status: integer (nullable = true)

|-- City: string (nullable = true)

|-- Title: string (nullable = true)

|-- Website\_Url: string (nullable = true)

|-- Price\_Range: string (nullable = true)

|-- number: integer (nullable = true)

|-- Zip: integer (nullable = true)

|-- Latitude: double (nullable = true)

|-- TicketNumber: integer (nullable = true)

|-- Html\_Content: string (nullable = true)

|-- Address-1: string (nullable = true)

|-- Hall-Node Name: string (nullable = true)

|-- Date: string (nullable = true)

|-- Longitude: string (nullable = true)

|-- Calender: string (nullable = true)

|-- Id: string (nullable = true)

|-- Type Of Event: string (nullable = true)

|-- Image\_Url: string (nullable = true)

|-- Subevent: string (nullable = true)

Here are the attributes and it’s description with examples:

**Status**: Undermined

**City**: City name - Example -Aarhus C

**Title**: Title of the concert. Example - KAMMERKONCERT

**Website Url**: Url provides website address.

<http://www.billetlugen.dk/referer/?r=266abe1b7fab4562a5c2531d0ae62171&p=/koeb/billetter/29048/46773/>

**Price range**: Ticket price range. Example: 85.00 - 115.00 DKK

**Numbe**r: Undermined column(Could not find documentation). Example: 1403593223

**Zip**: Zip code of the. location Example :8000

**Latitude**: Latitude information of the location. Example: 10.19887

**Ticket number**: Undermined. Example: 46773

**HTML\_Content**: Description of the event in html. Static html web page

**Address**: Concert hall name, Example : Thomas Jensens AllÃ©

**Hall Name**: Hall where Concert conducted. Example :  
 Symfonisk Sal (Symphony Hall)

**Date** : Datetime of Event Example :2014-09-21T15:00:00

**Longitude** : Longitude of event location Example :56.1519158

**Calender** : Event calender website URL Example : <http://www.musikhusetaarhus.dk/kalender/29048/>

**Id**: Undermined

**Type of Event:** Event type . There are two Event types  
in dataset 1. Musik(Music) 2.Andet(Other)

**Image URL** : Image of person (Persons) giving event Example [:http://static.billetlugen.dk/images/events/b/34768.jpg](http://static.billetlugen.dk/images/events/b/34768.jpg)

**Sub Event** : Event description Example :Klassisk koncert,Gratis(Classical concert Free)

## References:

### <https://www.w3.org/2005/Incubator/ssn/ssnx/ssn>

### <http://www.ict-citypulse.eu/page/sites/default/files/citypulse_d3.1_v1.3.pdf>

### <http://iot.ee.surrey.ac.uk:8080/datasets/aarhusculturalevents/culturalEvents_aarhus.ttl>

### <http://iot.ee.surrey.ac.uk/citypulse/ontologies/sao/sao#>

### <http://srvgal89.deri.ie:8080/ali_intizar/Publications/2015/CityBenchISWC2015.pdf>

### <https://en.wikipedia.org/wiki/TTL>

### <http://citypulse.insight-centre.org/ontology/ces/>