
Automated Wind Turbine Noise Recognition (WTNR) system

A Data Management Plan created using DMPTuuli

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Project abstract:

The overarching objective of this research is to develop an automatic environmental noise classification method which will lead to the development of more affordable noise monitoring systems. Currently, analyzing noise data collected from wind parks and classifying them into wind turbine noise and other noise sources is expensive because it is practically impossible to classify 24 hours of data measured every day for several months or years. The outcome of this research will automate this classification process thus reducing the cost of analysis. People don't have to rely on ISO model to know how much WT noise will reach their house. The price reduction in noise classification will enable a reduction in the price of hardware which combined can create low cost noise monitoring systems that people could use to identify the Sound Pressure Level (SPL) of WT reaching their homes. During my last scholarship period I applied several clustering methods and found out that HDBSCAN works the best. But still it is not very accurate in separating two different noise sources. We realized that, since sound is a continuum, we have to use some linear method to give us an estimate about how much each noise source contributes to the noise perceived at a particular location during a particular time. Thus, I will be using Partial Least Squares regression or Support Vector regression to give us the percentage or degree of each noise source at any given time. Then by applying further statistical techniques, questions like what is the noise level when a car passes by and how does Sound Pressure Level (SPL) changes when bird calls are involved in the background can be answered

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Aineiston yleiskuvaus

1.1 Millaiseen aineistoon tutkimuksesi perustuu? Millaista aineistoa kerätään, tuotetaan tai käytetään uudelleen? Missä tiedostomuodoissa aineisto on?

The project mainly uses noise data collected from the Honkajoki wind farm near Tampere, Finland. The data collection was done as part of another research project called WindSoMe which ended in 2017. Data was mainly collected from March, 2016 to April, 2017. This collected data is reused in my doctoral research. This project mainly uses sound data collected from a street approximately about 1 Km from the farm.

The data is stored in HDF5 file format.

1.2 Miten aineiston yhtenäisyys ja laatu varmistetaan?

The data is already stored in our local server and not edited anymore. So the data is always consistent.

Eettisten periaatteiden ja lainsäädännön noudattaminen

2.1 Mitä eettisiä seikkoja aineistosi hallintaan liittyy (esim. arkaluonteisten tietojen käsittely, tutkittavien identiteetin suojaaminen ja tietojen jakamista koskevan suostumuksen hankkiminen)?

Our data only contains environmental noise. No human being is involved in our data, so there is no need for identity protection or obtaining consent.

2.2 Miten aineiston omistajuuteen, tekijänoikeuksiin ja immateriaalioikeuksiin liittyviä asioita hallintaan? Estävätkö tekijänoikeudet, käyttöoikeudet tai muut rajoitukset aineiston käyttämisen tai jakamisen?

There is no copyright, ownership or intellectual property involved with our data.

Dokumentointi ja metatiedot

3.1 Miten dokumentoit aineistosi, jotta se on löydettävissä, saavutettavissa, yhteentoimivaa ja uudelleen käytettävissä sekä itseäsi että muita varten? Mitä metatietostandardeja, README-tiedostoja ja muuta dokumentaatiota käytät, jotta muut voivat ymmärtää ja käyttää aineistoasi?

Question not answered.

Tallentaminen ja varmuuskopiointi tutkimushankkeen aikana

4.1 Minne aineistosi tallennetaan ja miten se varmuuskopioidaan?

Our material is stored in our own servers in our office inside University of Vaasa campus.

4.2 Kuka valvoo pääsyä aineistoon ja miten suojattua pääsyä aineistoon valvotaan?

Only me and my supervisor can access our data. Our supervisor has read and write access I have only read access to the data.

Aineiston avaaminen, julkaiseminen ja arkistointi tutkimushankkeen päätyttyä

5.1 Mikä osa aineistosta voidaan asettaa avoimesti saataville tai julkaista? Missä ja milloin aineisto tai siihen liittyvät metatiedot asetetaan saataville?

Question not answered.

5.2 Mihin pitkällä aikavälillä arvokkaat tiedot arkistoidaan ja kuinka pitkäksi ajaksi?

The data will be stored until the environmental noise classification system is developed and its classification results reach an acceptable level of accuracy.

5.3 Arvioi, kuinka paljon aikaa ja työtä tarvitaan aineiston valmistelemaan julkaisua tai arkistointia varten.