**FFT**

FFT or Fast Fourier Transform is an algorithm to transform a signal from time-space domain into frequency domain. It’s often used to analyze stationary systems and its vibrations. (cite:Signalverarbeitung) In our research we did perform a FFT with a hope to reveal some more information out of data during feature engineering process.

To transform the signal python scipy.fftpack package with default parameters was used to perform the FFT transformation. At first signal 1 and Signal 1 DN were transformed for Sample 2 and plotted. Figure xxx shows these 2 Signals after transformation. Signal 1 DN has one peak at 0 and is constant in the higher frequencies, showing no peaks (no further information). Signal 1 has multiple peaks all over the spectrum. Since there could be some info behind these oscillations, we will take signal 1 as input for the further FFT analysis.

Graphical user interface, chart

Description automatically generated

In figure xxx FFT of signal 1 for four different samples are shown. On the left plot Samples 3 and 203 are shown. Sample 3 was contaminated with WD 40 and has NOK = 0 label while Sample 203 was contaminated with Gleitmo and its NOK = 1. While observing the two FFT’s from 2 different samples no obvious differences can be registered. Both samples have peaks at frequency = 0 which can be interpretated as an oscillation with a very large period. In comparison to the left plot, on the right both samples are NOK = 0. Similarly, to the plot on the left no huge differences can be detected between these two samples. Thus, it can be said, FFT doesn’t reveal the difference between:

1. NOK or OK
2. WD40 or Gleitmo

And isn’t useful as an input for the classifier.

Chart

Description automatically generated with low confidenceChart

Description automatically generated with medium confidence

Bibliographic Information

* **Book Title**Signalverarbeitung
* **Book Subtitle**Analoge und digitale Signale, Systeme und Filter
* **Authors**Martin Meyer
* **DOI**https://doi.org/10.1007/978-3-8348-8138-0
* **Publisher**Vieweg+Teubner Verlag Wiesbaden
* **eBook Packages**[Computer Science and Engineering (German Language)](https://link.springer.com/search?facet-content-type=%22Book%22&package=11774&facet-start-year=2011&facet-end-year=2011)
* **Copyright Information**Vieweg+Teubner Verlag | Springer Fachmedien Wiesbaden GmbH, Wiesbaden 2011
* **eBook ISBN**978-3-8348-8138-0
* **Edition Number**6