Dataset: UNSW TMCM gear-crack dataset 2021

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Description:

The data was collected from the single-stage spur gear test-rig of the Tribology and Machine Condition Monitoring (TMCM) group at the University of New South Wales in 2020-2021 for the diagnostics and severity assessment of gear cracks.

The following journal paper includes the description of the test rig, details on the cracks, and other information about the experiments.

Zhan Yie Chin, Pietro Borghesani, Yuanning Mao, Wade A. Smith, Robert B. Randall, Use of transmission error for a quantitative estimation of root-crack severity in gears, Mech. Syst. Signal Process. 171 (2022) 108957. https://doi.org/10.1016/j.ymssp.2022.108957.

Please consider citing this resource if it is relevant to your work.

Each *.mat* data file is named as "Data_{xx}Hz_{yy}Nm_{z}.mat", where {xx} and {yy} are the nominal speed and torque of the input shaft respectively, and {z} is the crack severity of the gear. For instance, a healthy-gear file measured with the input shaft running at a nominal speed of 5 Hz and under a nominal torque of 10 Nm will be "Data_05Hz_10Nm_H.mat". Actual values of torque and speed (different from the nominal values) can be obtained from the data itself.

A total of 90 test files are available, corresponding to all the combinations of the following:

- Crack severity: Healthy (H), Small crack (S), Medium crack (M), Large crack (L)
- Speed: 2, 5, 10, 15, 20 Hz (nominal values)
- Torque: 0, 5, 10, 15, 20 Nm (nominal values)

Each *.mat* data file contains the following variables:

- *Fs*: sampling frequency
- *torqueAvg*: actual torque (averaged) of the input shaft in Nm
- *signals* (an N-row 5-column matrix, where N is the number of samples):
    - 1st column: tacho signal of input shaft (1 pulse/rev)
    - 2nd column: encoder signal of input shaft (3600 pulses/rev)
    - 3rd column: tacho signal of output shaft (1 pulse/rev)
    - 4th column: encoder signal of output shaft (3600 pulses/rev)
    - 5th column: acceleration in horizontal direction, near motor (m/s^2)

Please note that N = 4,200,000 samples per channel for all speeds except for 2 Hz, where N = 12,200,000 samples per channel. Data is encoded in single precision to minimise file size, but it is possible to convert it to double precision before processing to increase accuracy.

For any further information, please contact the Tribology and Machine Condition Monitoring group (TMCM) of UNSW Sydney.