A 3D texture dataset of 27 km road

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**Abstract**

This dataset represents the 3D road surface texture of a route of 27 km long in a resolution of 0.1 m approximately in both longitudinal and transversal directions. The first purpose of the dataset is to test numerical programs that need road surface topographies as input. The dataset is composed of 2658 text files and each representing a section of that route. The data was collected with the Harris2, a vehicle operated by TRL (Transport Research Laboratory from the UK), equipped with a LiDAR (Light Detection and Ranging) and a PPS (Road-Profile System). The files are presented in a regular grid achieved by merging the LiDAR and the PPS data into 3D coordinates.

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**Specifications Table**

| Subject              | Civil and Structural Engineering          |
|----------------------|-------------------------------------------|
| Specific subject area| Road monitoring                           |
| Type of data         | Table (text files)                        |
| How data were acquired| The data were collected using the survey vehicle HARRIS2 operated by TRL. The vehicle is fitted with a Road-Profile System (PPS) high-resolution transverse profile laser, and a rotating LiDAR head to obtain point cloud. |

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The dataset is composed of 2658 text files. Each file representing a section of about 10 m long of that route with, and named with the number of the section followed by the extension (Example: “0.txt, 1.txt, 2.txt ... n.txt”).

\[
\begin{array}{ccc}
    x_1 & y_1 & z_{x_1, y_1} \\
    \vdots & \vdots & \vdots \\
    x_1 & \vdots & \vdots \\
    x_2 & y_2 & z_{x_2, y_2} \\
    \vdots & \vdots & \vdots \\
    x_2 & \vdots & \vdots \\
    x_n & y_n & z_{x_n, y_n} \\
    \vdots & \vdots & \vdots \\
    x_n & \vdots & \vdots \\
\end{array}
\]

x and y represent the coordinates to localize a given point on the plane (x,y) and z the height of that point. x, y, z are in m. x- and y-directions are respectively the longitudinal and the transversal of the route with resolutions 0.0976 m and 0.0999 m approximatively.

The road surface is discretized with a regular mesh. The data represent the heights of each of the nodes of this surface located by the coordinates (x,y).

Data source location
https://data.mendeley.com/datasets/b4cvrb7f8g/1

Data accessibility
No restriction, just download the zip file via the link
https://data.mendeley.com/datasets/b4cvrb7f8g/1 and unzipped to get 2658 text files representing each section of about 10 m long and 4.2 m width.

[1] “A 3D road surface topography dataset of an entire route”, Mendeley Data, V1, https://doi.org/10.17632/b4cvrb7f8g.1

Related research article
M. Kane, Road Safety: First step of an Algorithm to Identify the Potential Water Ponding on Routes, January 2021, Measurement, https://doi.org/10.1016/j.measurement.2021.108980

Value of the Data

• This dataset is giving the topography of a road surface over an entire route with such a high resolution.
• This dataset is useful to test numerical programs (such as the potential of water ponding of a route or any or drive further investigations, which need road surface topographies as inputs).

1. Data Description

This dataset is composed of 2658 text files and each representing a section of a route of about 27 Km long. The files in a regular grid achieved by merging the LIDAR and the PPS data into 3D coordinates. The road surface is discretized with a regular mesh. The data represent the heights (z) of each of the nodes of this surface located by the coordinates (x,y). x and y represent the coordinates to localize a given point on the plane (x,y) and z the height of that point. x, y, z are in m. x- and y-directions are respectively the longitudinal and the transversal of the route
with resolutions 0.0976 m and 0.0999 m approximatively. The data is represented in each of the files as follows:

\[
\begin{align*}
&x_1 \quad y_1 \quad z_{x_1,y_1} \\
&\vdots \quad \vdots \\
&x_1 \quad y_n \quad z_{x_1,y_n} \\
&x_2 \quad y_1 \quad z_{x_2,y_1} \\
&\vdots \quad \vdots \\
&x_2 \quad y_n \quad z_{x_2,y_n} \\
&\vdots \quad \vdots \\
&x_n \quad y_1 \quad z_{x_n,y_1} \\
&x_n \quad y_n \quad z_{x_n,y_n}
\end{align*}
\]

Each file of about 10 m long, and is named with the number of the section followed by the extension (Example: “0.txt, 1.txt, 2.txt … n.txt”).

2. Experimental Design, Materials and Methods

The road data was collected using the survey vehicle HARRIS2 (Fig. 1) operated by TRL on a route of 27 km long located in the UK. The vehicle is fitted with a Road-Profile System (PPS) high-resolution transverse profile laser, and a rotating LiDAR to obtain point clouds. The raw data collected is not presented on a regular grid and must be resampled first to be used in the automated program. To do so, the raw LiDAR data must be translated into a reference frame that can be compared with those provided by the PPS [2].

![Fig. 1. HARRIS2 vehicle with PPS laser and LiDAR attached.](image)

CRediT Author Statement

Malal Kane: Writing - Original draft preparation, data formatting, software development.
Declaration of Competing Interest

Malal Kane declares that he has no known competing financial interests or personal relationships, which have or could be perceived to have influenced the work reported in this article.

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References

[1] M. Kane, Road safety: first step of an algorithm to identify the potential water ponding on routes, Measurement (2021), doi:10.1016/j.measurement.2021.108980.
[2] M. Kane, A 3D road surface topography dataset of an entire route, Mendeley Data V1 (2021), doi:10.17632/b4cvrb7f8g.1.