

Numerical Optimization

CENG-597

Project Status Report

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Data Generation

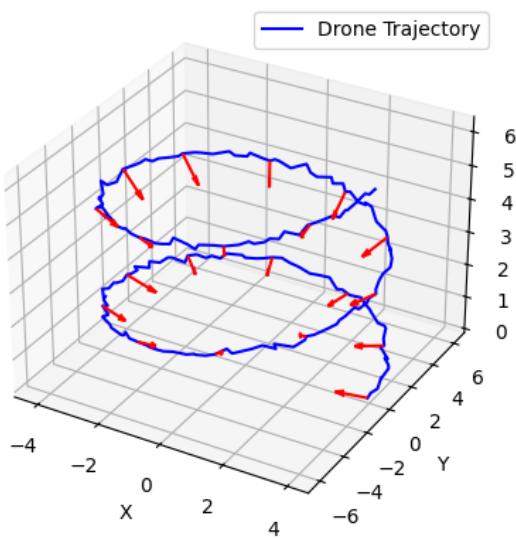


Figure 1: Drone Trajectory

I achieved to generate the **synthetic noisy** data to simulate realistic drone motion. Here the parameter values used:

$$\begin{aligned}r_x &= 4 \rightarrow \text{radius along X-axis} \\r_y &= 6 \rightarrow \text{radius along Y-axis} \\h &= 0.5 \rightarrow \text{height}_{\text{step}}/\text{radian} \\\theta &\in [0, 4\pi] \rightarrow \text{total trajectory angle} \\N_\theta &= 200 \rightarrow 200 \text{ steps resolution} \\\sigma &= 0.08 \rightarrow \text{noise factor}\end{aligned}$$

Cost function is defined as follows:

$$\begin{aligned}J(\mathbf{p}, \mathbf{n}) &= \sum_{i=1}^N \|\mathbf{p}_i - \mathbf{y}_i^p\|^2 + \sum_{i=1}^N \|\mathbf{n}_i - \mathbf{y}_i^n\|^2 + \\&\quad \lambda_1 \sum_{i=2}^{N-1} \|\mathbf{p}_{i+1} - 2\mathbf{p}_i + \mathbf{p}_{i-1}\|^2 + \\&\quad \lambda_2 \sum_{i=2}^{N-1} \|\mathbf{n}_{i+1} - 2\mathbf{n}_i + \mathbf{n}_{i-1}\|^2\end{aligned}$$

Why it is defined in this way is clearly explained in the project itself (in the .ipynb files).

I calculated the gradient and the hessian of the **cost function** but I did **not** yet started to implement **optimization methods**.