Numerical Optimization
CENG-597

Project Status Report

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Data Generation

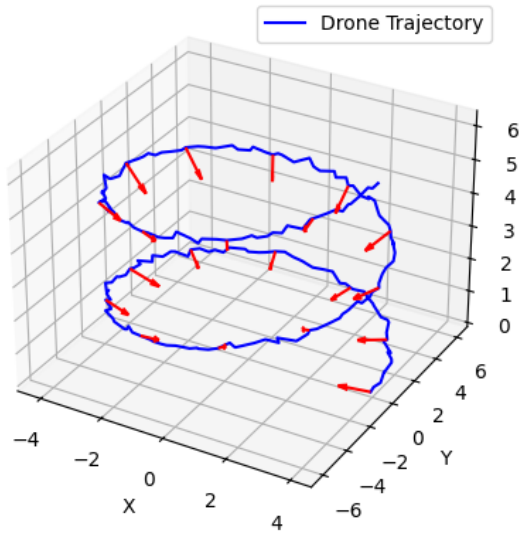

Figure 1: Drone Trajectory

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

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

Cost function is defined as follows:

$$J(\mathrm{p}, \mathrm{n}) = \sum_{i=1}^{N} (\mathrm{p}_i - y_i^{\mathrm{p}})^2 + \sum_{i=1}^{N} (\mathrm{n}_i - y_i^{\mathrm{n}})^2 + \lambda_1 \sum_{i=2}^{N-1} (\mathrm{p}_{i+1} - 2\mathrm{p}_i + \mathrm{p}_{i-1})^2 + \lambda_2 \sum_{i=2}^{N-1} (\mathrm{n}_{i+1} - 2\mathrm{n}_i + \mathrm{n}_{i-1})^2$$

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

I did **not** yet started to implement **optimization methods**.