Tomography reconstruction from 2D projections

Maxime Mazouth–Laurol

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Reminder So far, the work was about highlighting sinograms for basic images thanks to complete parallel projections, and verifying well-known Helgason-Ludwig conditions. For now, the aim of the project is to emphasize new DCC applicable directly on truncated projections. Thus, we are first concerned here with retrieving truncated data, then using them to check this new DCC described below :

$$p = \Re f \text{ for some density function } f \Leftrightarrow B_n(x) = \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} p(\phi, x\cos\phi + y0\sin\phi)\frac{\tan^n\phi}{\cos\phi}d\phi$$

is a polynomial of degree n. This is supposed to be true for the line $y = y0$ well-positioned as described in[1]

1 Results

Hence, for a framework looking-alike the one provided in the document, consistent results are derived, attesting the truth of the mathematical property of B_n, for n $\in \mathbb{N}$.

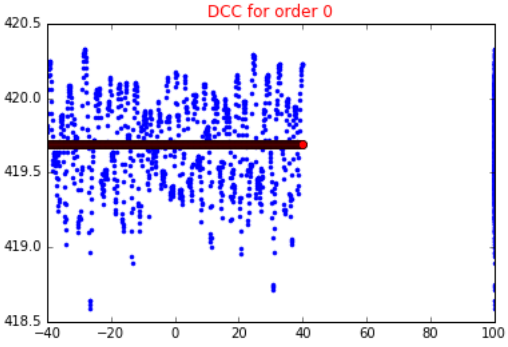

Figure 1: DCC Order 0

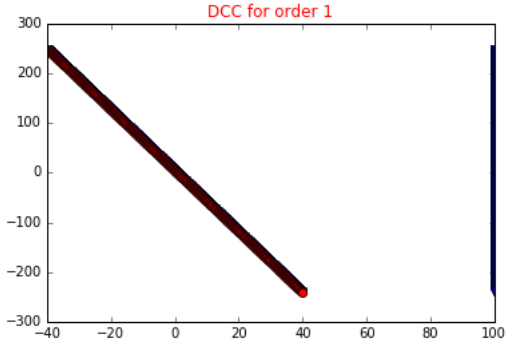

Figure 2: DCC Order 1

The polynomial approximation is a **least square polynomial fit**, obtained with `numpy.polyfit` function.

There is no analysis of these results yet, but one can notice how accurate this approximation is with respect to the B_n values, which looks positive for now.

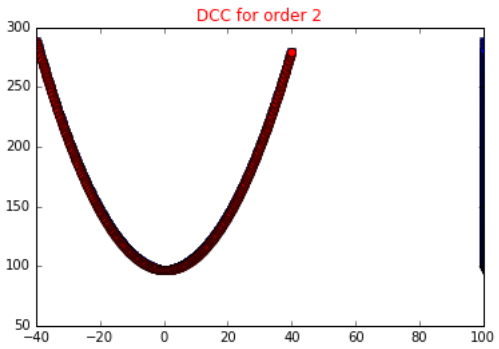

Figure 3: DCC Order 2

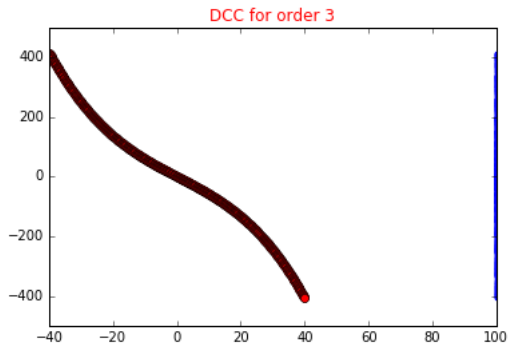

Figure 4: DCC Order 3

References

[1] Martin Hartvig, Ken Andersen, and Jan E Beyer. Food web framework for size-structured populations. 272:113–122, 03 2011.