Computing recurrence relations of truncated polynomials

Let R be a commutative ring and $s = (s_j)_{j\in\mathbb{N}_0}$ a sequence of elements of R^n for some $n \in \mathbb{N}$. The *recurrence ideal* or *annihilator* $\operatorname{Ann}(s)$ of s is the set of all polynomials $f = \sum_{i=0}^{n} f_i x^i$ which satisfy

$$\sum_{i=0}^{n} f_i s_{k+i} = 0 \text{ for all } k \geq 0.$$

Recurrence relations play an important role in mathematics and computer science, and their (efficient) computation is an interesting problem.

Hyun, Neiger, and Schost published algorithms to compute the recurrence ideal of sequences in R^n where $R = \mathbb{K}[x]/(x^d)$ of truncated polynomials [1].

The aim of thesis is to research the literature, explain the theory in thorough detail and implement the algorithms in SageMath.

[1] Seung Gyu Hyun, Vincent Neiger, and Éric Schost, *Algorithms for linearly recurrent sequences of truncated polynomials*, ISSAC '21—Proceedings of the 2021 International Symposium on Symbolic and Algebraic Computation, ACM, New York, 2021, pp. 201–208.

For further details and literature talk to

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