**Reverse Engineering of Data Structures on Strings**

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**Data Structures for String Processing**

There are many data structures for processing strings efficiently such as suffix arrays and border arrays.

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**Reverse Problem on Palindromic Structures of Strings**

A palindrome is a symmetric string that reads the same forward and backward.

For any $s \in \Sigma^*$, $s$ is a palindrome if and only if $s = s^R$.

**Maximal Palindromes**

- A palindrome is a symmetric string that reads the same forward and backward.
- If $w[i..j]$ is a palindrome and $w[i-1..j+1]$ is not a palindrome, $w[i..j]$ is called a maximal palindrome at center $i$ and denoted as $(i, j)$.

**Pals(w)**: the set of maximal palindromes of $w$.

- For a string $w$ of length $n$, $|Pals(w)| = 2n+1$.

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**Parameterized Matching Problem**

Given text $T$ and pattern $P$, answer all positions in $T$ such that $P$-match $Pn$.

**Parameterized Border Array**

- Using the $p$-border of $Pn$, we can solve $p$-matching problem in $O(|T|+|Pn|)$ time.
- The $p$-border of a string $s[1..n]$ is an array with the longest $p$-borders of length $i$ prefixes ($i = 1, \ldots, n$), e.g. $s[1..3] = bab$.

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**Related Work**

- [Bannai et al., 2003]
- [Duval and Lefebvre, 2002]
- [Duval and Lefebvre, 2003]
- [Sakamoto et al., 2003]
- [Schwarz et al., 2000]
- [Tomohiro I, 2003]
- [Trinity College of Dublin, 2003]
- [University of Aizu, 2003]
- [University of Aizu, 2003]