FIT3155: Week 3 tutorial
Covering concepts from Week 2

Objectives: The tutorials, in general, give practice in problem solving, in analysis of algorithms and data-structures, and in mathematics and logic useful in the above.

Instructions to the class: Prepare your answers to the questions **before** the tutorial. It will probably not be possible to cover all questions unless the class has prepared them all in advance.

Instructions to Tutors:

  i. The purpose of the tutorials is not to solve the practical exercises.

  ii. The purpose is to check answers, and to discuss particular sticking points, not to simply make answers available.

1. Revise the full Boyer-Moore's exact pattern matching algorithm, paying attention to the details of:

   - the (extended) bad character rule
   - the good suffix rule

2. Prove that when a good suffix is found (see slide #37 in your lecture slides) the proposed shift-rule (on that slide) never shifts `pat` incorrectly past an occurrence in `txt`, and hence is a safe shift.

3. Prove that when a good suffix is NOT found (see slide #38) the proposed shift rule (on that slide) based on the precomputed `matchedprefix(.)` values, never shifts `pat` incorrectly past an occurrence in `txt`, and hence is a safe shift.

4. When a `pat` is found in `txt`, reason why the shift rule proposed on the slide #39 is correct (and safe).

5. Revise Knuth-Morris-Pratt's (KMP) algorithm for exact pattern matching.

6. Refer to the slide #43 to understand the definition of $\mathbf{SP}_i$ values computed on `pat`. After this, reason why the pseudocode on slide #44 computes the $\mathbf{SP}_i$ values correctly.

7. Refer to the slide #45. It proposes the 'KMP shift rule' of `pat` by $i - \mathbf{SP}_i$ places. Prove that this shift *never* shifts incorrectly past an occurrence of `pat` in `txt`.

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