Creation, Innovation, Technology & Research Exposition (CITReX 2015), UMP, 9-10 March 2015

Yuhani Yusof[a], Wen Li Lim[a], Mohd Fariduddin Mukhtar[b] and Sahimel Azwal Sulaiman[a]

Futures & Trends Research Group, [a]Faculty Industrial Sciences & Technology, Universiti Malaysia Pahang, Leburaya Tun Razak, 26300 Gambang, Pahang.
[b]Kampus Teknologi, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka

BEHAVIOUR OF DNA SPLICING LANGUAGE PREDICTOR

ABSTRACT:

Recombinant DNA technology, joining two DNA molecules together to produce new genetic combinations is of value to medicine, agriculture and science industry. This new invention of software programming has been developed using Visual Basic in order to predict the number pattern of resulted molecules after the cut and paste phenomenon of two double-stranded DNA, based on the theorems that have been formulated by using Y-G splicing system. In addtion, the characteristics of restriction enzymes in terms of palindromic and inverse complement properties are also determined. Also, the software programming can be utilized for scientists to determine the behaviour of resulted molecules such as whether a molecule can participate in further splicing or disappeared after the experiment has run through completion.

INTRODUCTION:

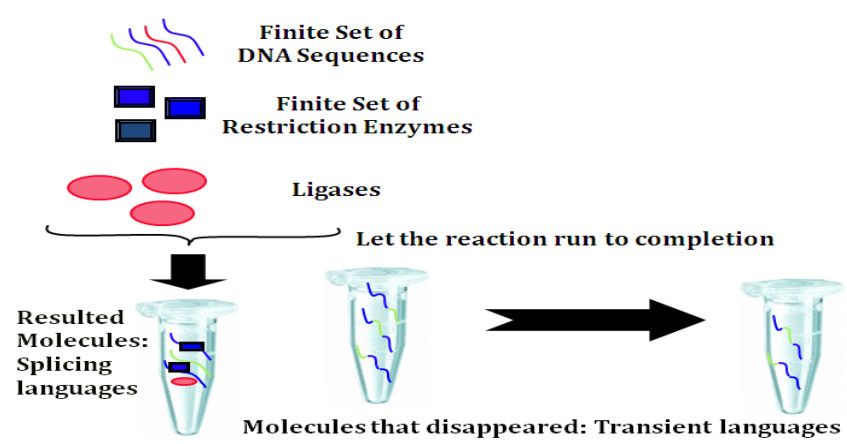


Figure 1: Process of Recombinant DNA

Helping you to determine the final molecules in equilibrium state

PRELIMINARIES:

Palindromic [4]
A string *I* of dsDNA is said to be palindromic if the sequence from the left side of the upper single strand is equal with the sequence from the right side of the lower single strand.

Inverse Complement
A string x is an inverse complement to another string y if $x = y'$, where $x, y \in A^*$. Two strings I_1 and I_2 of dsDNA are said to be inverse complement to each other if the sequence from the left side of the upper single strand of I_1 is equal to the complement of first upper single strand with the sequence from the right side in I_2.

Active Persistent Language [4]
An active persistent language is a set of strings that participate in further splicing and is also contained in the limit language

Inert Persistent Language [6]
Adult strings, also called inert strings in a splicing language, are strings in a splicing system which cannot be used for splicing. Adult molecules show a steady increase in quantity throughout the reaction, and are not involved in further interactions with other molecules or enzymes.

Transient Language [6]
A transient language is a set of strings that disappeared at the end of reaction.

Trivial Splicing [4]
Molecules that can be spliced and generate themselves.

RESULTS:

LIMIT ADJACENCY MATRIX MODEL IN THE PROGRAM DEVELOPMENT:

$$A_{ij}^{\infty} = \begin{array}{c} \\ w_1 \\ w_2 \\ \vdots \\ w_i \end{array} \begin{array}{c} \begin{array}{cccc} w_1 & w_2 & \cdots & w_j \end{array} \\ \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \end{array}, \text{ for all } 1 \le i \le n, 1 \le j \le n$$

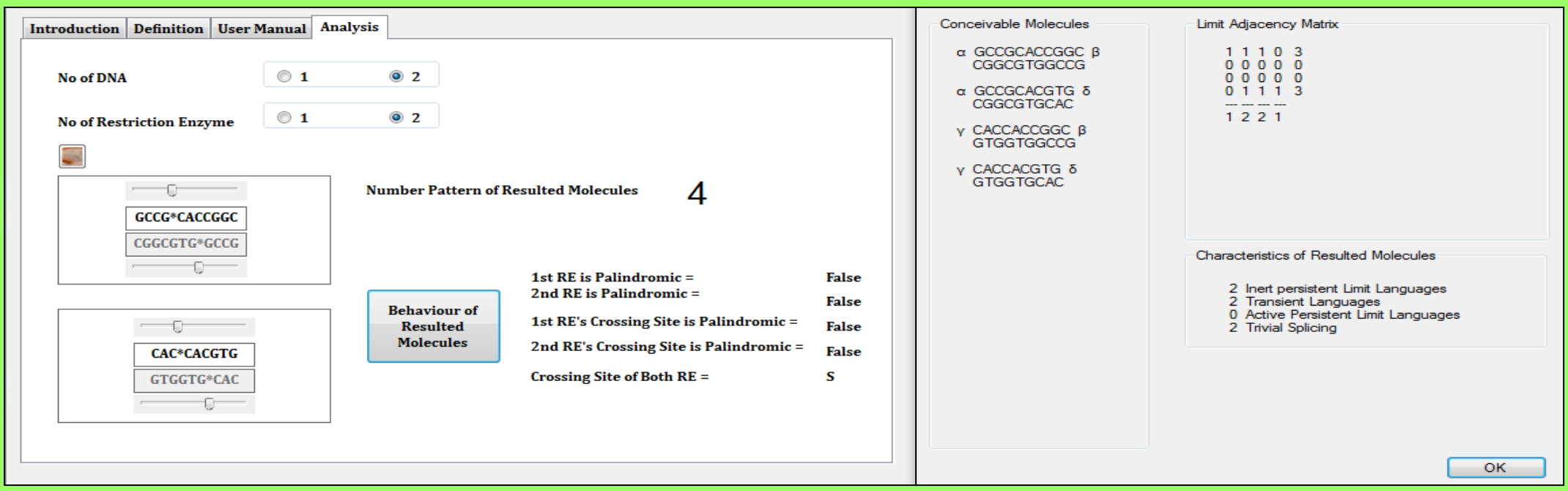
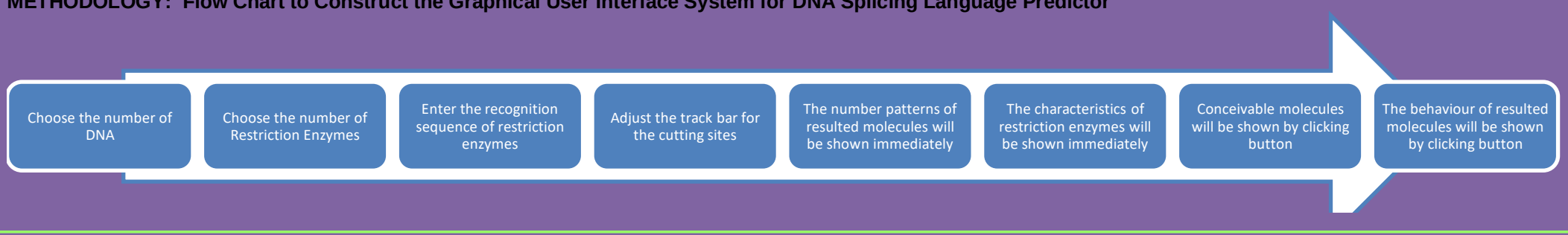


Figure 2: User Friendly Interface of DNA Splicing Language Predictor of Resulted DNA Molecules

METHODOLOGY: Flow Chart to Construct the Graphical User Interface System for DNA Splicing Language Predictor



REFERENCES:

1. T.Head, Formal language theory and DNA: an analysis of the generative capacity of specific recombinant behaviors. Bulletin of mathematical biology, 49(6),737-759, 1987
2. R. H. Tamarin, *Principles of Genetic*, 7th. Ed. USA: The Mac-Graw Hill Companies, 2001
3. D. Hartl, *Genetics*, Jones and Bartlett Publishers, Aug 5, 2011
4. Y. Yusof, "DNA Splicing System Inspired by Bio Molecular Operations", Ph.D. Thesis, Universiti Teknologi Malaysia of Malaysia, 2012
5. Research Biolabs Sdn. Bhd. *New England Biolabs2011-12 Catalogue & Technical Reference.* USA: Catalogue. 2011
6. E. Goode and D. Pixton, 2004. Splicing to the Limit. *Lecture Notes in Computer Science*. **2950**: 289-201

ACKNOWLEDGEMENTS:

The authors gratefully acknowledge Research and Innovation Department UMP for the financial funding through UMP Research Grant Vote No: RAGS Grant Vote No: RDU 131404.