PERSISTENCY & PERMANENCY OF SPLICING SYSTEM VIA dE BRUIJN GRAPH

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ABSTRACT

A model via de Bruijn graph is constructed on predicting the persistency and permanency properties of two stages deoxyribonucleic acid (DNA) splicing system. This model works as well as a user friendly interface (UI) that is developed via Microsoft Visual C Sharp (C#). In biological point of view, this model will optimize time and money on predicting the persistency and permanency of the existence or new hybrid molecules of DNA in the experimental recombinant process. This model works up to two stages DNA splicing system and mathematically developed based on Yusof-Goode (Y-G) approach.

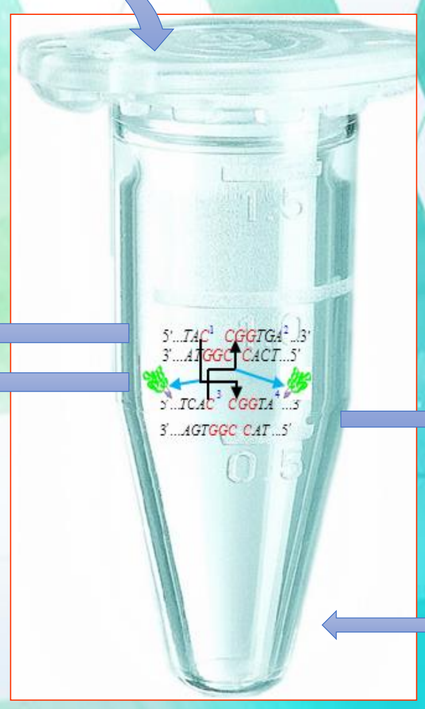
Keywords: de Bruijn Graph, Persistency, Permanency and Yusof-Goode (Y-G) Splicing System

1. INTRODUCTION

5′...*TA*CCGGTGA...3′
3′...*AT*GGCCACT...5′

5′...*TCA*CCGGTA...3′
3′...*AGT*GGCCAT...5′

*Hpa*II



DNA Cut

DNA Ligase

5′...*TA*CCGGTGA...3′
3′...*AT*GGCCACT...5′ ...(1,2)

5′...*TA*CCGGTA...3′
3′...*AT*GGCCAT...5′ .....(1,4)

5′...*TCA*CCGGTGA...3′
3′...*AGT*GGCCACT...5′ .....(3,2)

Recombinant DNA strands

The recombinant DNA strands are persistent, because they can cut again by the restriction .

$S=(A,I,R)$

Figure 1: Test Tube of Recombination Process

4. BENEFITS

1. The persistency of the DNA splicing system can be simply determined.
2. In the future, this model will lead to determine the 'target' traits in DNA sequence.

5. MARKETABILITY/ COMMERCIALIZATION/ POTENTIAL MARKET

1. This development will further benefit the field of biomathematics and bio-molecular computing in Malaysia as a basic in devising new techniques of DNA splicing system or commercialization purposes. For example, as a program that can add-on in the New England Biolabs (NEB) tools.
2. Copyright.

6. ACHIEVEMENTS

1 Solve the problem on predicting the behaviour of DNA recombinant.
2. Optimize time and money in handling the experiments.

8. PUBLICATIONS

1. Mohammad Hassan Mudaber, Yuhani Yusof, Mohd Sham Mohamad and Lim Wen Li. (2015). Persistency and Permanency of Two Stages Splicing Languages via Yusof-Goode (Y-G) Approach: Two Initial Strings and Two Rules. *Jurnal Teknologi*. 77(1): 223-228. ISSN 2180–3722. Scopus indexed. (Published: 01/10/15).
2. Mohammad Hassan Mudaber, Yuhani Yusof, Mohd Sham Mohamad and Wen Li, Lim. (2015). Persistent And Permanent Point of Views of Two Stages DNA Splicing Languages. *ISCA Research Journal of Mathematical and Statistical Sciences*. 3(1): 15-23. ISSN 2320–6047. Google scholar indexed. (Published: 09/01/15).
3. Mohammad Hassan Mudaber, Yuhani Yusof, Mohd Sham Mohamad, Aizi Nor Mazila Ramli and Lim Wen Li. (2015). Modelling of Two Stages DNA Splicing Languages on de Bruijn Graph. *Jurnal Teknologi*. 72(1): 1-6. ISSN 2180–3722. Scopus indexed. (Published: 15/12/15).
4. Mohamad Hassan Mudaber, Yuhani Yusof, Mohd Sham Mohamad and Wen Li Lim. (2015). Persistency and Permanency of Two Stages DNA Splicing Languages with Respect to One Initial String and Two Rules via Yusof-Goode (Y-G) Approach. AIP Conference Proceedings. ISBN: 978-0-7354-1281-1. ISI indexed. DOI: 10.1063/1.4907513. (Published: 03/02/15).
5. Mohammad Hassan Mudaber and Yuhani Yusof. (2015). Two Stages Splicing System. AIP Conference Proceedings. *International Conference on Mathematics, Engineering and Industrial Application (ICOMEIA)*. ISBN: 978-0-7354-1304-7. ISI Indexed. DOI: 10.1063/1.4915679. (Published: 15/05/15).
6. Mohammad Hassan Mudaber, Yuhani Yusof and Mohd Sham Mohamad. (2014). Predicting the Persistency and Permanency as well as Relations between Two Stages DNA Splicing Languages using C#. *Proceedings of the 10th IMT-GT International Conference on Mathematics, Statistics and its Applications 2014 (ICMSA2014)*. pp. 199-206. ISBN 978-967-0524-67-2.
7. Mohammad Hassan Mudaber, Yuhani Yusof and Mohd Sham Mohamad. (2014). Some Sufficient Conditions for Persistency and Permanency of Two Stages DNA Splicing Languages via Yusof-Goode Approach. AIP Conference Proceedings. ISBN: 978-0-7354-1241-5. ISI indexed. DOI: 10.1063/1.4887655. (Published: 10/07/14).
8. Mohammad Hassan Mudaber, Yuhani Yusof and Mohd Sham Mohamad. (2014). Some Relations between Two Stages DNA Splicing Languages. AIP Conference Proceedings. ISBN: 978-0-7354-1236-1. ISI indexed. DOI: 10.1063/1.4882496. (Published: 19/06/14).

2. OBJECTIVE

To describe and model the two stages DNA splicing system via de Bruijn graph.

3.0 NOVELTY/ INVENTIVENESS/ METHODOLOGY

A graph model that works on predicting the persistency and permanency of two stages DNA splicing system.

Table 1: Novelty of Innovation

No.	Year	Researcher	Finding
1.	1978	Head, T.	• Introduce the mathematical theory and pseudocode of persistent (focus on crossing site only).
2.	1992	Gatterdam, R.	• Introduce the theory of permanent.
3.	2013	Karimi, F.	• Introduce sufficient condition for persistent splicing system and proof the persistency of same splicing system conducted in different phase via experiment.
4.	2014	Mudaber, MH et. al	• Introduce some characteristics of persistent splicing system based on four factors: number of crossing site, crossing site and left & right context of restriction enzyme up to two stages. • User friendly interface (UI) predictor: persistency and permanency of splicing system.
5	Current	Yusof, Y et. al	• Prediction of persistency and permanency of splicing system via de Bruijn graph

NEW

Come with:
- Seven(7) Theorems
- Seven(7) Corollaries
- Twelve(12) Lemmas

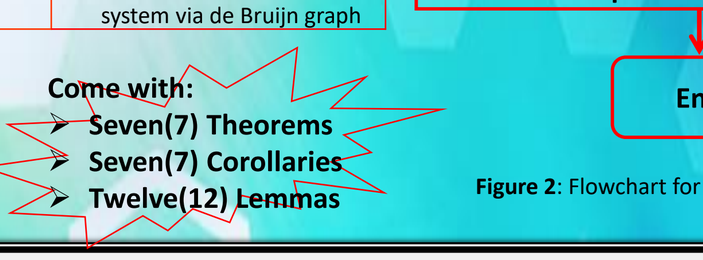


Figure 2: Flowchart for Research Methodology

7. RESULTS

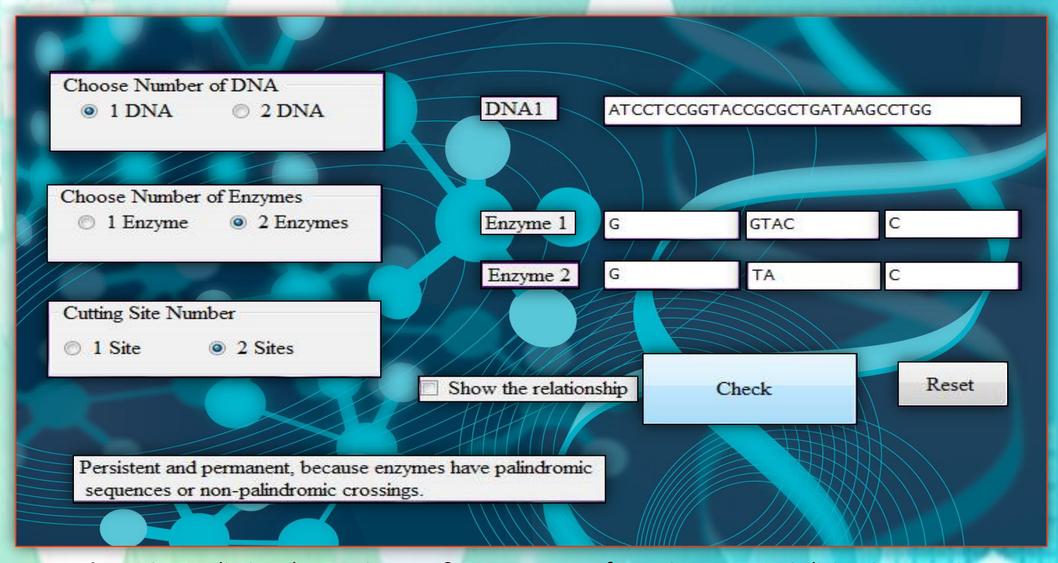


Figure 3: Predicting the Persistency & Permanency of Two Stages DNA Splicing System via UI

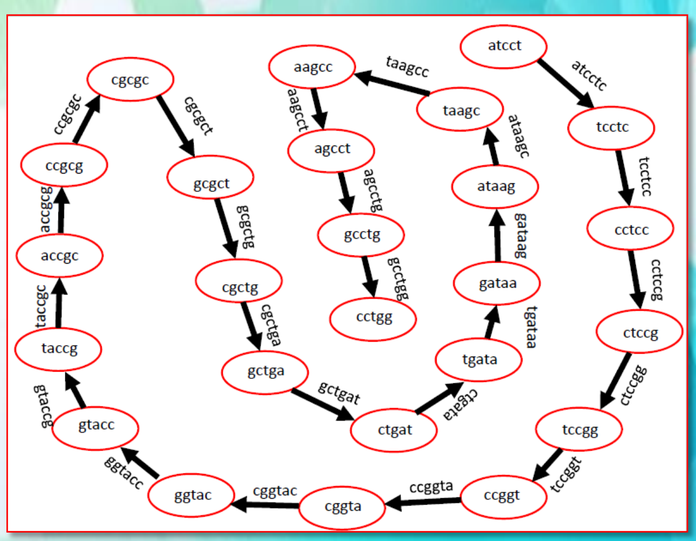


Figure 4: Predicting the Persistency & Permanency of Two Stages DNA Splicing System via de Bruijn Graph

As a conclusion, this system works on predicting the persistency and permanency of DNA splicing system which is applicable in DNA recombination process.

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