

## 11) KIA SIANG HOCK

### Enhancing search and discovery across libraries, archives and museums using text, data and audio analytics, using a single OneSearch service

#### 1. About the Case Organization

The National Library Board of Singapore (NLB) manages the National Library, the 26 Public Libraries and the National Archives of Singapore (NAS). NLB promotes reading, learning and information literacy by providing a trusted, accessible and globally-connected library and information service through the National Library and a comprehensive network of Public Libraries. NAS oversees the collection, preservation and management of public and private archival records, including government files, private memoirs, maps, photographs, oral history interviews and audio-visual materials.

#### 2. About the Challenge

Libraries and archives collect and provide access to digital resources of significant national, cultural and heritage values. Their collections are painstakingly curated, described and made accessible.

A seismic shift in the information seeking behaviour has taken shape. With the ever-expanding reach of the Internet, users are accustomed to quick and easy access to content, and are expecting an online experience that is rich and instant. How can libraries and archives continue to reach out to their users in this era of shortened attention span?

Every year, NLB users collectively contribute to tens of millions of e-retrievals. We see every single one of these interactions as a golden opportunity to 'push' relevant content to the user. The success of the 'customers who bought this item also bought' recommendation feature at amazon.com is a clear testament of the power of pushing relevant recommendations. However, to effectively connect people to content, we need to connect content to content first.

#### 3. What We Did

To manually associate related content for any sizeable collection will be very labour-intensive. Text and data mining (TDM) technologies can automatically, efficiently and accurately identify these associations. TDM is akin to sieving through all the content, and applying well-established information retrieval theories to identify similar content.

NLB implemented TDM on its digital content, and identified over 1 billion similarity associations. We can now bring together the full spectrum of resources available in NLB regardless of institutions, formats and language and present them in a way that encourages a deeper understanding of the precious memories of the nation.

It is also what knowledge seekers have been dreaming of. They can spend less time gathering the pieces, and focus on digesting and analysing the 'dossier' of relevant information to derive new insights.

#### 4. Challenges and Lessons Learned

The first hurdle that we needed to cross is the technical one. As we planned to use TDM for large data sets, we looked for solutions built on the popular Hadoop big data platform. The expertise in these technologies was lacking locally. We have our own Solutions Architect to work on proof-of-concepts to pick up the skills.

The next challenge came when we need to scale the TDM to process a data set of over 10 million items. It proved too much even after we scaled our Hadoop cluster to 13 servers. We went back to the drawing board, and figured that we could split the data set into smaller clusters of related ones before the TDM processing. This 'divide-and-conquer' approach worked very well.

#### 5. Impact and Benefits

With over 1 billion associations identified via TDM, a massively inter-connected network of knowledge has been formed.

The related resources identified via TDM are made easily available to the users. The users are now able to view and explore related resources within and across collections and media formats. Information is no longer viewed in isolation, but seen as a part of the larger context. We call this contextual discovery.

The initial results have been promising. The level of access to the resources has increased.

The screenshot shows the Singapore Infopedia article for 'The Merlion'. The page includes the Singapore Government logo, a search bar, and social media sharing options. The main content features a large image of the Merlion statue and several paragraphs of text detailing its history, design, and significance. A 'Recommendations' sidebar on the right lists related articles like 'Mouth of the Singapore River' and 'Singapore Binnate'. A 'Related Pictures' section at the bottom shows a gallery of images.

## 6. Next Steps

We are exploring several possibilities to bring contextual discovery to the next level:

- *Cross-institution.* With NAS coming under NLB, we now have an expanded collection of digital resources on Singapore. We will be working on linking NAS and the National Library resources.
- *Cross-language.* There are 4 official languages in Singapore: English, Chinese, Malay and Tamil. We are considering the use of machine translation to provide cross-language recommendations.

## 12) MARK GLIKSON

### Deploying a Semantic Operating System in a small financial services company

#### 1. About the Case Organization

O-Pulse provides a portal for investment advisors to manage client relationships, compliance, and communications with portfolio managers. Currently in private Beta, O-Pulse was founded by a leading third party money management & financial advisory firm based in North Carolina.

#### 2. About the Challenge

Typical of many conventional Enterprises today, the founders of O-Pulse, in their existing financial advisory firm, recognized the need to transform their traditional offline organization into a modern digital enterprise. Management faced increasing pressure, with a noticeable uptick in client attrition to competitors with even the most basic online client portals. O-Pulse was established to create an online portal better servicing their existing advisor clients, and the wider US-based independent investment advisor market.

The v1 O-Pulse portal was designed to facilitate complex targeted content distribution and syndication between portfolio managers, investment advisors and their clients. News, articles, portfolio commentaries and financial updates could be curated, shared and syndicated through one central dashboard with full compliance reporting. A key requirement was to enable white label deployment of the O-Pulse portal to any number of organizations under a SaaS subscription model.

O-Pulse engaged with multiple development firms only to be faced with exorbitant open-ended quotations. All proposals utilized a common "silo" build methodology; inflating costs throughout the development cycle with limited asset re-use and extensive

# Enhancing search and discovery across libraries, archives and museums

## OneSearch & Text Analytics

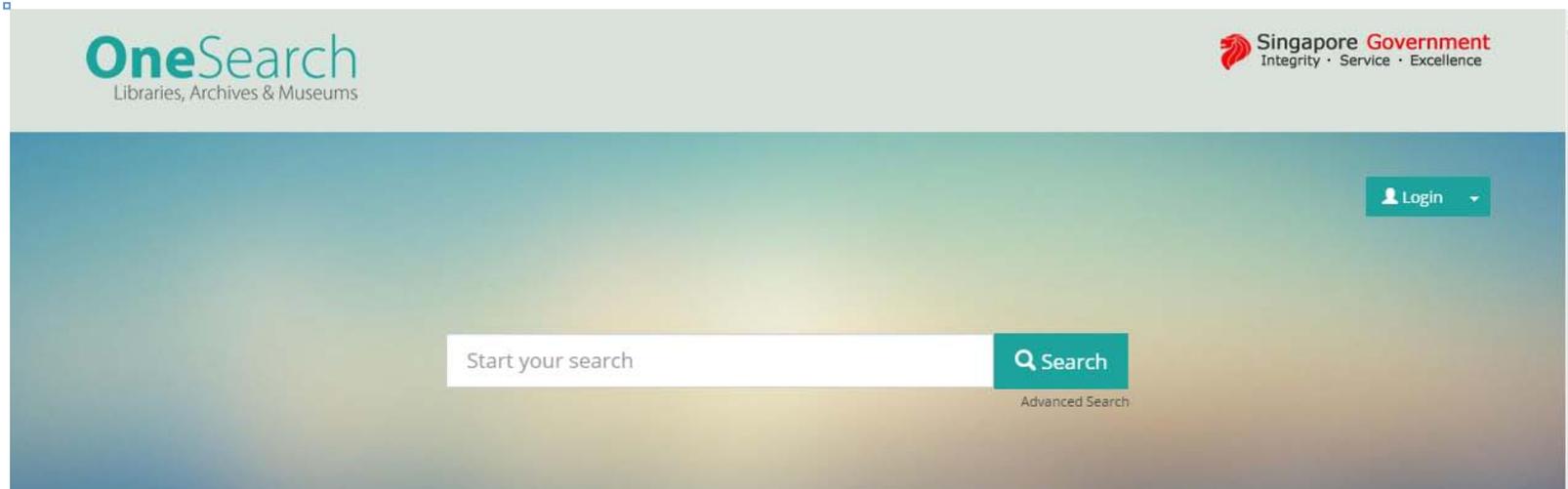
Kia Siang Hock

Deputy Director

Technology & Innovation



# OneSearch – Libraries, Archives & Museums



- Find resources across institutions
  - National Library
  - National Archives
  - Public Libraries
  - Public Museums
- *'Bento-style'* search result display
  - Resources are not 'hidden' in one long list of search results
- Responsive web and flat design to cater to all devices

<http://search.nlb.gov.sg>

# OneSearch Content Coverage



Login

Tan Swie Hian

Search

Advanced Search

**BookSG**

A digital collection of Singapore

Home / Arts

Email Share Like

A guide to Tan Swie Hian

This is a guide to the private mu  
paintings and sculptures of the



Title  
Creat  
Subje

Publisher  
Digital Description

music  
SG



Meditation of a

New music forum

Home > Meditation of a poet

Information about



Album: **New music forum**

Performer(s): **New Music**

NLB National Library Board Singapore

Libraries

Where you are: Home » Full Display

BRN: 5447020  
Record 1 of 1

Additional information  
for this title

Physical Des

NATIONAL ARCHIVES OF SINGAPORE

Photographs

HOME ABOUT PHOTO

Unedited Description Supplied by Tr

Conditions

Do you have more information on this record

philosophy of life and spirit

NewspaperSG

Home Ask a Librarian Research Guide Book

The Straits Times, 14 July 1992

One-man museum for Tan Swie Hian

Article also available on microfilm reel NL17726 [Lee Kong

Add to Citation View Printer-friendly Page

One-man museum



National Heritage Board

Pride in our Past, Legacy for our Future

SEARCH RESULT



Home > Collections > National Collection > Singapore Collec

Portrait of Lu Xun

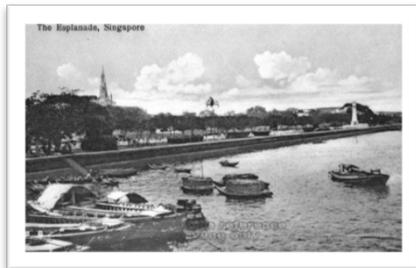
Artists:	Tan Swie Hian
Date/Period:	1993
Region:	Singapore
Dimension:	H136.8 x W
Accession No.:	2002-00411
Collection of:	Singapore
Category:	Paintings

Born in 1943 in Indonesia, Tan migrated to Singapore in 1968, he worked at the Frer 1985, Tan was awarded the Gold Medal of t

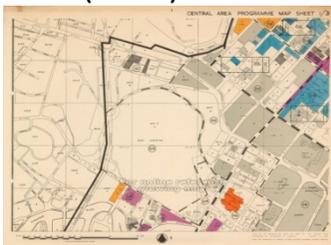
NLB users retrieved tens of millions of e-content every year

It would be really nice if we could convert every single e-retrieval instance into an **enriching discovery experience** for every single user every time...

# Discover related content regardless of institutions, formats and languages



Master Plan for Singapore - Central Area (1958)



The Cenotaph, located at Esplanade Park along Connaught Drive, is a war memorial which commemorates the sacrifice of the men who perished during World War I and World War II. It was unveiled on 31 March 1922 by the Prince of Wales. On 28 December 2010, it was gazetted as a national monument together with two other structures in...



**Lim Bo Seng (Article)**  
Major-General Lim Bo Seng (b. 27 April 1909, Nan Ann, Fujian, China - d. 29 June...

**Dalhousie Obelisk (Article)**  
Dalhousie Obelisk, landmark, located at Empress Place in the Central Region. The tall...

**Gwee Peng Kwee**   
His daily routine school...  
Laying of foundation stone and unveiling of Cenotaph...

## Newspaper articles

Singapore's War Memorial to the Glorious Dead (11 Nov 1920)



Singapore's War Memorial (21 Sep 1921)



Arrival of the Prince (31 Mar 1922)

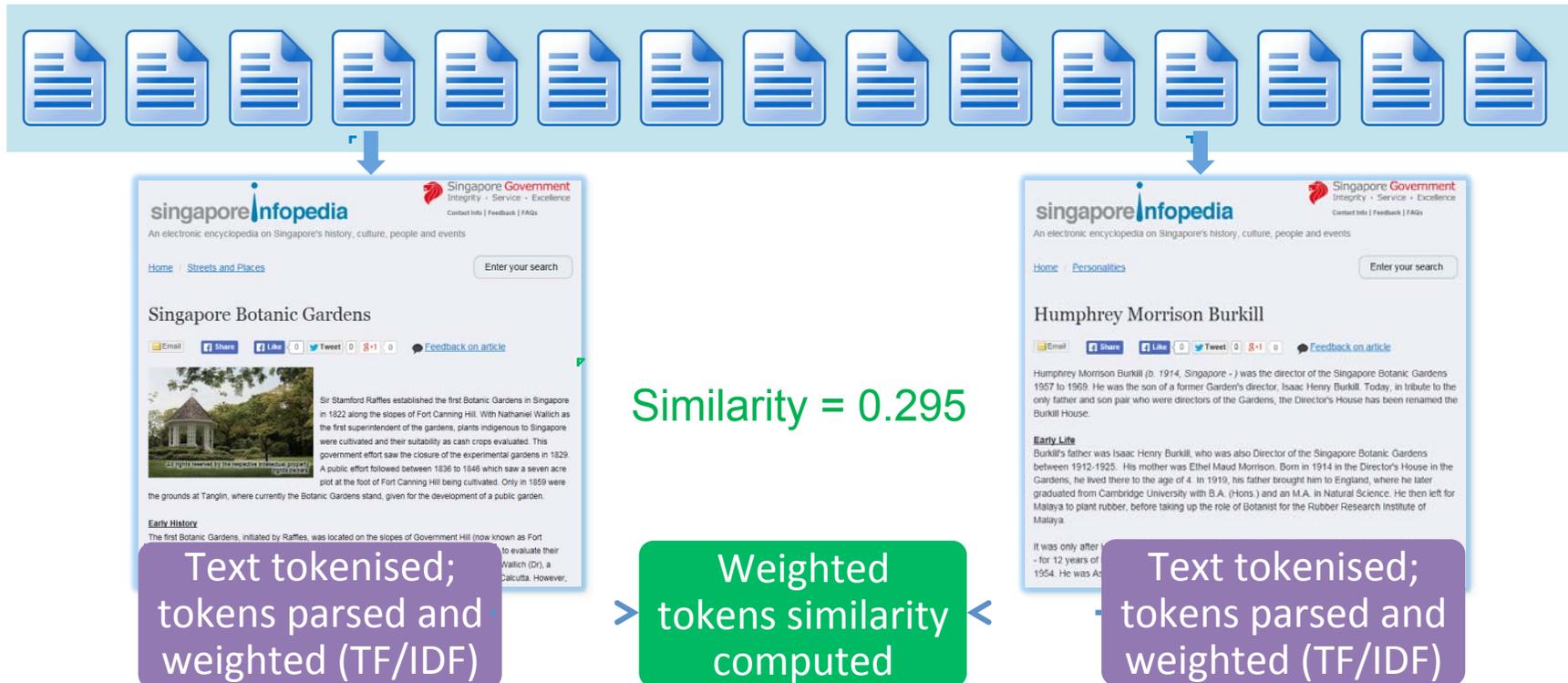


Lest we forget (8 Nov 1953)



Singapore students learn to care about history (13 Jul 1997)

# Using text analytics to automatically identify related content



# Using clustering to handle large datasets

Clustering is the task of grouping a set of objects in such a way that objects in the same group (called a cluster) are more similar (in some sense or another) to each other than to those in other groups (clusters)



Mahout K-Means Clustering  
with Cosine Distance



# Implementations of Contextual Discovery – over 1 billion associations identified

**Infopedia**  
Singapore botanic gardens

**Implemented in Jul 2013**

On Stamford Raffles established the first Botanic Gardens in Singapore in 1822 along the slopes of Fort Canning Hill. With Nathaniel Wallich as the first superintendent of the gardens, plants indigenous to Singapore were cultivated and their suitability as cash crops evaluated. This government effort saw the closure of the experimental gardens in 1829. A public effort followed between 1836 to 1846 which saw a seven-acre plot at the foot of Fort Canning Hill being cultivated. Only in 1850 were the grounds at Tanglin, where currently the Botanic Gardens stand, given for the development of a public garden.

**Early history**  
The first Botanic Gardens, initiated by Raffles, was located on the slopes of Government Hill (now known as Fort Canning Hill). Its purpose then was the experimental cultivation of plants, such as nutmeg and clove, to evaluate their economic value and suitability as cash crops. It occupied 58 acres and was supervised by Nathaniel Wallich (D), a Danish surgeon and naturalist who had previously been the Superintendent of the Royal Gardens in Calcutta. However, it proved to be too expensive to upkeep and was abandoned in June 1829.

**Public effort**  
On 24 May 1836, the Agricultural and Horticultural Society was formed and one of its initial actions was to call for the government of that day to encourage agriculture and its development. This appeal led to a grant of seven acres of land around the foot of Fort Canning Hill. However, by 1846, the society became defunct.

**At Tanglin**  
The present Botanic Gardens, located in Tanglin district, was set-up by a revived Agri-Horticultural Society in 1859. The 23-ha plot was acquired from Hooh Hui Kay (Wahpoo), an industrial businessman. Lawrence Neave, a supervisor of an adjoining nutmeg plantation was enlisted to develop the area into a pleasure garden. Roads, terraces and a bandstand were constructed in the Gardens. Almost the entire original layout designed 142 years ago remains today. The Gardens expanded with the acquisition of additional surrounding land. A zoo was added to attract more visitors. The role of the Gardens then was mostly recreational. Growing financial difficulties finally forced the management of the Botanic Gardens to be handed over to the Colonial Government in 1874.

The Gardens assumed a more scientific and economic role with the appointment of keen-trained botanists and horticulturists as administrators of the grounds. Under their direction, the Botanic Gardens was again tasked with the study of new plant species for commercial exploitation, and also with hybridising experimentation, especially with orchids. Thus, the Gardens became well known for introducing and promoting many plants of economic value to Southeast Asia, especially the Para rubber tree by Henry Ridley, the father of the region's rubber industry; and the hybrid orchid.

During the 1970s and 1980s, the role of the Gardens was geared more towards satisfying the recreational needs of Singaporeans. Many of the Gardens' amenities and visitor attractions were improved while under care of the Parks and Recreation Department.

On June 1990, the Singapore Botanic Gardens came under the management of the National Parks Board. A Redevelopment Master Plan was drawn up to provide new and improved public amenities, research infrastructure and training facilities. Plans to be carried out in three phases spanning 1990 to 2005. Today, the Gardens house over 2,700 species and hybrids, a collection of 650,000 specimens of dried and pressed plants and a comprehensive 22,000-volume library. This makes it one of the most important centres for plant taxonomic and biodiversity research in the region, apart from its recreational and educational attraction for local and international visitors alike.

**Author**  
Phyllis Teo

**References**  
Kiew, R., & Ian M. T. (2001). *Singapore Botanic Gardens: A souvenir guide*. Singapore: Landmark Books. (Call no. RSHNG 560.735957 KIE)  
Malapace, W., Brodie, G. E., & Braden, R. St. J. (Eds.) (1991). *One hundred years of Singapore* (pp. 43-79). Singapore: Oxford University Press. (Call no. RSHNG 959.57 ONE)  
Tay, E. P., et al. (1989). *Local flora guide to the Singapore Botanic Gardens*. Singapore: Singapore Botanic Gardens. (Call no. RSHNG 580.7445957 PIC)  
Timney, B. (1983). *Singapore green: A history and guide to the Botanic Gardens*. Singapore: Times Book International.

**NewspaperSG**  
Singapore Government  
Integrity · Service · Excellence

**Implemented in Jul 2014**

The Straits Times, 26 April 1994, Page 6  
**Lion with fish tail is Tourist Board's new emblem**  
[Article also available on microfilm reel: NS12120. (See Kong Chuan Reference Library - On shelf)]

**Lion with fish tail is Tourist Board's new emblem**

**SINGAPORE, Fri. — A lion with a fish tail rising from a shimmering sea on which the words "Lion City" appear has been adopted by the Tourist Promotion Board as its emblem. This emblem will be used in**

**Related Articles**  
Use of Merlion emblem, *Viverrina On the Lionel emblem*  
The Straits Times, 27 January 1997

Use of Merlion emblem, *Viverrina On the Lionel emblem*  
The Straits Times, 27 January 1997

Use of Merlion emblem, *Viverrina On the Lionel emblem*  
The Straits Times, 27 January 1997

**Search Results: merlion**  
Full View  
Page Selections: 1/2  
The Straits Times, 22 February 1997, Page 1

**PictureSG**  
Singapore Government  
Integrity · Service · Excellence

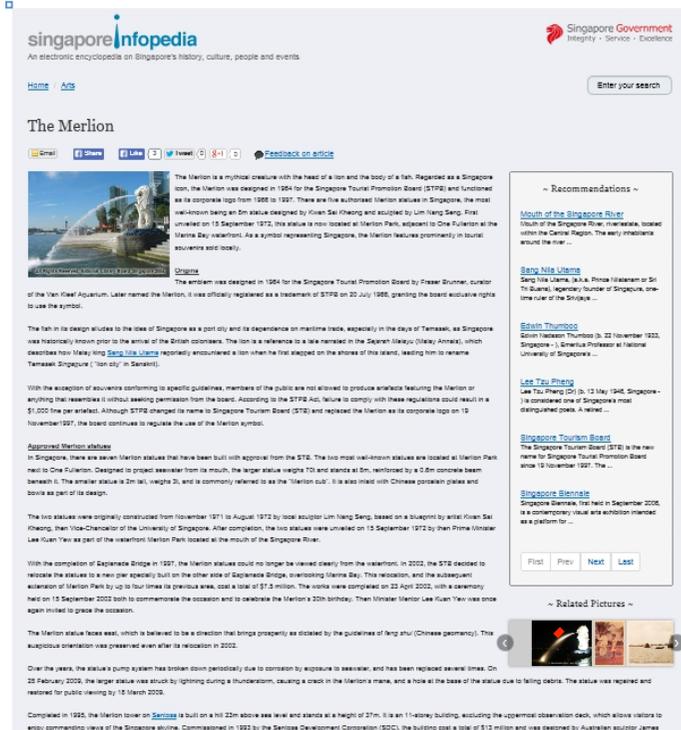
**Implemented in Sep 2013**

Search for pictures  
Content · Tag

**Similar Contents**

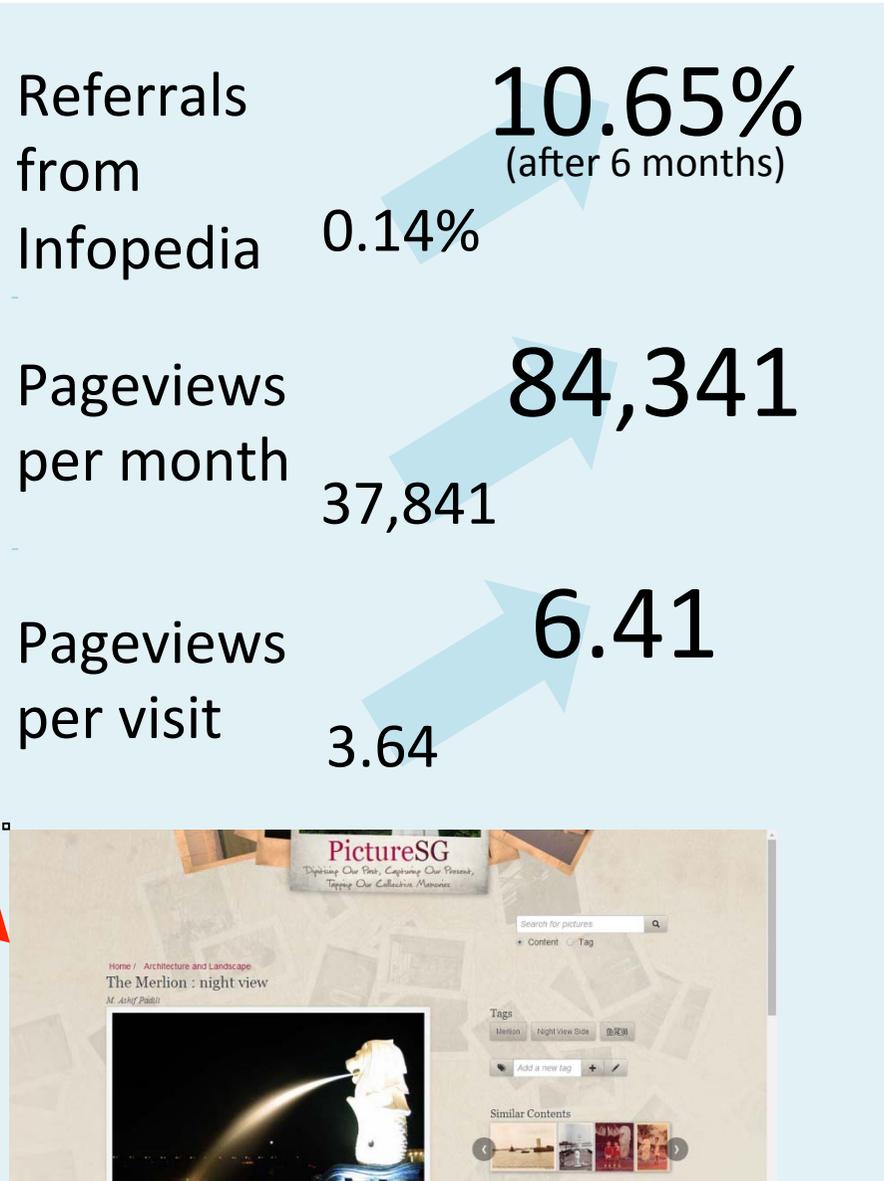
This 1990s photograph from G.R. Lambert & Co shows a view of the Botanic Gardens. Located in the Tanglin district, it was set-up by a revived Agri-horticultural

# Increased usage of content



Infopedia

PictureSG



# Thank You!

[kia\\_siang\\_hock@nlb.gov.sg](mailto:kia_siang_hock@nlb.gov.sg)

