國立臺灣大學電機資訊學院資訊工程研究所
碩士論文
Department of Computer Science and Information Engineering
College of Electrical Engineering and Computer Science
National Taiwan University
Master Thesis

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MsWave

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碩士論文

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王瑞斌 撰

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國立臺灣大學（碩）博士學位論文
口試委員會審定書
論文中文題目
論文英文題目

　　本論文係○○○君（○學號○）在國立臺灣大學○○學系、所完成之碩（博）士學位論文，於民國○○年○○月○○日承下列考試委員審查通過及口試及格，特此證明

口試委員：

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（指導教授）

_____　　_____

_____　　_____

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_____　　_____

系主任、所長 _____（簽名）

（是否須簽章依各院系所規定）

致謝

　　這裡將簡單介紹如何利用 LaTeX 來編輯你的畢業論文，若不知道 LaTeX 是什麼或是沒有概念的話，建議你可以簡單看過放在此資料夾裡的李果正 -大家來學 LaTeX前四章內容，在下載適合的 LaTeX 整合發行套件之後（請看第 III.項），可以嘗試用剛安裝好的 LaTeX 編輯器來編譯thesis.tex這份文件，編譯的方法可以看下面第 V.項的介紹，若編譯成功，所編譯出來的 thesis.pdf 文件的應該會跟此 demo.pdf 文件一模一樣，而且沒有任何問號符號，走到這一步的話，就差不多可以開始邊學習 LaTeX 邊編輯你的畢業論文了！基本上會使用到的指令都包含在論文的的各章節裡，怎麼在論文裡寫公式或是放圖之類的就自行看 tex 檔學吧。如果有任何問題或建議可以來信與我討論，我的信箱是dran31545@gmail.com，或是到此範本Google Project裡面的Issues貼上你的問題與建議，我會盡我所能更新此範本，也歡迎大家自行重製、改良此範本並散布給他人，祝大家順利畢業！

要編輯致謝請打開acknowledgementsCH.tex

I. 此範本參考並修改自下列網站的資料：
- 如何用 LaTeX 排版臺灣大學碩士論文
  —台灣大學論文 LaTeX 樣版原創者黃子桓的教學網頁
- LaTeX 常用語法及論文範本
  —Hitripod所修改的範本，這裡參考了許多他所寫的格式和內容
- 使用 LaTeX 做出精美的論文
- XeTeX：解決 LaTeX 惱人的中文字型問題
- 台灣大學碩士、博士論文的 Latex 模板

II. 幾個有用的參考資料及網路資源：
- 李果正 -大家來學 LaTeX—建議先看完前四章
- WIKIBOOKS-LaTeX—好用的線上工具書
- Working with a .bib file using JabRef
- Using BibDesk - A short tutorial
- LaTeX for Physicists

III. 下載 LaTeX 整合發行套件，可參考 TeX Collection：

1. MacTeX: For **MacOSX**，下載 MacTeX.pkg
2. ProTeXt: For **Windows**，下載 ISO file
3. TeX Live: For **GNU/Linux** and **MacOSX**, and **Windows**，下載 ISO file
4. CTAN: The Comprehensive TeX Archive Network.

IV. 好用的程式：

- 文獻管理系統：
  1. JabRef
     可參考 Working with a .bib file using JabRef 或是 Google 及 YouTube
  2. BibDesk (For Mac)
     可參考 Using BibDesk - A short tutorial 或是 Google 及 YouTube
- 方程式編輯器：Daum Equation Editor (Chrome App，必須使用 Google 瀏覽器)

V. 編譯流程：

1. xelatex thesis
   對 thesis.tex 進行第一次 XeLaTeX 編譯，產生 thesis.pdf 以其他檔案
2. bibtex thesis
   對 thesis.tex 進行 BibTeX 編譯，產生 bbl 檔以及 blg 檔
3. xelatex thesis
   對 thesis.tex 進行第二次 XeLaTeX 編譯，產生目錄、圖表連結及參考文獻
4. xelatex thesis
   對 thesis.tex 進行第三次 XeLaTeX 編譯，產生參考文獻連結，完成編譯

注意！此範本使用 cite 套件，可依據你利用文獻管理系統所整理好的 thesisbib.bib 檔在論文最後產生參考文獻頁面，若你的系所規定要在每個章節的後面產生參考文獻，則可以用 chapterbib 套件，來對每個有附參考文獻的章節 tex 檔進行一次 BibTeX 編譯產生 bbl 檔，如範例的 introduction.tex、THM.tex 和 EXP.tex，如果有這需要請把 thesis.tex 檔裡使用 cite 套件的指令利用註解符號 % 來取消使用 cite 套件，並刪去出現在使用 chapterbib 套件指令前面的註解符號 % 來啟動使用 chapterbib 套件

```
\usepackage{cite}
%\usepackage{chapterbib}
```

改成

```
%\usepackage{cite}
\usepackage{chapterbib}
```

再來利用註解符號%取消會把參考文獻放在論文最後的指令

```
\bibliographystyle{unsrt}
\addcontentsline{toc}{chapter}{\bibname}
\bibliography{thesisbib}
改成
%\bibliographystyle{unsrt}
%\addcontentsline{toc}{chapter}{\bibname}
%\bibliography{thesisbib}
```

再把用來輸入章節檔案的 \input 指令改成 \include 指令

```
\input{introduction}  =>  \include{introduction}
\input{THM}           =>  \include{THM}
\input{EXP}           =>  \include{EXP}
```

最後記得在每個有附參考文獻的章節加上產生參考文獻的指令，即在introduction.tex、THM.tex和EXP.tex三個檔案裡最後啟動下面兩行指令

```
%\bibliographystyle{unsrt} => \bibliographystyle{unsrt}
%\bibliography{thesisbib}  =>  \bibliography{thesisbib}
```

而編譯時則需要對有附參考文獻的introduction.tex、THM.tex和EXP.tex各做一次 BibTeX 編譯，編譯流程如下

1. xelatex thesis
   對 thesis.tex 進行第一次 XeLaTeX 編譯，產生 thesis.pdf 及其他檔案
2. bibtex introduction
   對 introduction.tex 進行 BibTeX 編譯，產生 bbl 檔以及 blg 檔
3. bibtex THM
   對 THM.tex 進行 BibTeX 編譯，產生 bbl 檔以及 blg 檔
4. bibtex EXP
   對 EXP.tex 進行 BibTeX 編譯，產生 bbl 檔以及 blg 檔
5. xelatex thesis
   對 thesis.tex 進行第二次 XeLaTeX 編譯，產生目錄、圖表連結及參考文獻

6. `xelatex thesis`
   對 thesis.tex 進行第三次 XeLaTeX 編譯，產生參考文獻連結，完成
   編譯

VI. 補充說明與注意事項：

- 口試委員會審定書：
  請到台大圖書館網頁的電子論文服務下載論文格式範本，並修改
  成正確的格式，也可到此範本所在資料夾的cert.doc修改。當然你
  也可以利用 LaTeX 來編輯，你只要填好ntuvars.tex檔的資料，並去
  除在 thesis.tex 裡下面這行的註解符號※

  `%\makecertification`

  編譯完後就可以產生審定書格式。口試通過後，請把已經簽名的
  審定書掃描成 pdf 檔，再取代原本的cert.pdf，即可放上已簽名的審
  定書。處理審定書出現的指令在 thesis.tex 裡

  `%----------- generate the certification ...`
  `%\makecertification`
  `%----------- includepdf by using package ...`
  `\addcontentsline{toc}{chapter}{口試委員會審定書}`
  `\includepdf[pages={1}]{cert.pdf}`

- 浮水印：
  資料夾已經附上浮水印檔案了，若學校有更改，到請到台大圖書館
  網頁的電子論文服務下載pdf 格式的浮水印到此範本所在資料夾。
  若要開啟關閉浮水印功能，即自行刪去或加上下面位於thesis.tex指
  令的註解符號※

  `%\CenterWallPaper{0.174}{watermark.pdf}`
  `%\setlength{\wpXoffset}{6.1725cm}`
  `%\setlength{\wpYoffset}{10.5225cm}`

- 單面印刷與雙面印刷：
  此範本為單面印刷，若論文頁數超過 80 頁，依規定需要用雙面印
  刷，此時只需把 thesis.tex 裡的

  `\documentclass[a4paper, 12pt, oneside]{book}`
  改成
  `\documentclass[a4paper, 12pt, twoside]{book}`

- 如何加入附錄?

在thesis.tex裡，依需求選擇 input 或 include，刪去 % 符號來輸入附錄章節

```
%---------- Input your appendix here  ----------
%\input{AppendixA}
%or %chapter cite  == \include
%\include{AppendixA}
```

在章節檔 AppendixA.tex 裡，開頭打

```
\chapter{First appendix title}
```

即可，以此類推。

- 系上規定論文圖表須全部放到最後獨立出來的章節，且章節不出現在目錄中：
  在thesis.tex裡，依需求選擇 input 或 include，刪去 % 符號來輸入圖表章節

```
%---------- Input your Figure chapter here  ----------
%\input{EndFigTab}
%chapter cite  == \include
%\include{EndFigTab}
```

在章節檔EndFigTab.tex裡有範例和說明可供參考，要注意正文的圖表和附錄的圖表要分清楚，即在EndFigTab.tex內

```
\renewcommand{\thefigure}{\arabic{chapter}.
\arabic{figure}}
\renewcommand{\thetable}{\arabic{chapter}.
\arabic{table}}
%--- Input your main figures and tables here  ---
```

這幾行之後章節計數器格式已切換為 1...9，放正文的圖表，

```
\renewcommand{\thefigure}{\Alph{chapter}.
\arabic{figure}}
\renewcommand{\thetable}{\Alph{chapter}.
\arabic{table}}
%--- Input your appendix figures and tables here  ---
```

這幾行之後章節計數器格式已切換為 A...Z，放附錄的圖表。另外要取消圖表的浮動功能，才能讓圖表按照指令出現順序排好，即把平常使用的圖表指令

```
\begin{figure}[htb]
...
\begin{table}[htb]
```

改成

```
\begin{figure}[!]
...
\begin{table}[!]
```

剩下的只要注意章節圖表的計數器設定即可。\ref 和 \label
指令可以在此圖表章節與正文章節使用。

- 如果我想要修改 margin(文字邊界) 的話，可以從哪裡下手呢?
  請打開ntu.sty修改下面這行的上下左右參數即可：

  ```
  \RequirePackage[top=3cm,left=3cm,bottom=2cm,right=3cm]
  {geometry}
  ```

- 我想引用 Twomey (1974): Pollution and planetary albedo 這篇論文，
  如何用 \cite 引用它的時候在內文顯示 Twomey (1974) [編號]？
  建議使用 natbib 套件，參考資料如下：
  LaTeX/Bibliography Management
  Overview of Bibtex-Styles
  Reference sheet for natbib usage

- X∃TEX ：
  此範本中文字體使用X∃TEX 轉換，細節請參考Hitripod寫的XeTeX：
  解決 LaTeX 惱人的中文字型問題。

- 如何輸入英文 '單引號' 和 "雙引號" 以及不同長度的破折號？
  可以參考李果正 -大家來學 LATEX第 17 頁針對標點符號的遊戲規
  則，範例如下，輸入以下指令：

  ```
  `單引號'\\
  ``雙引號''\\
  -hyphen\\
  --en-dash\\
  ---em-dash\\
  ```

  則顯示：
  '單引號'
  "雙引號"

-hyphen
–en-dash
—em-dash

中文摘要

請打開並編輯abstractCH.tex

關鍵字：壹、貳、參、肆、伍、陸、柒

Abstract

Open and edit abstractEN.tex

Key words:A, B, C, D, E, F, G

Contents

List of Figures

List of Tables

Chapter 1

Get started with LaTeX

Three common font styles in this text:

- **Item1**: *Italic 中文 123*

- **Item2**: **Bold 中文 123**

- **Item3**: *slant 中文 123*

About the advance latex grammer see the next section 1.1.

1.1 LaTeX Adavanced Features

The following features would be introduced in the coming subsections:

- SubSection 1.1.1: **Figure**

- SubSection 1.1.3: **Verb**

- SubSection 1.1.3: **Verb**

- SubSection 1.1.4: **Enumeration**

- SubSection 1.1.2: **Table**

- SubSection 1.1.5: **Code Display**

- SubSection 1.1.6: **Math**

- SubSection 1.1.7: **Algorithms**

1.1.1 Figure

Figure 1.1: A picture of a tiger.

Figure 1.1 is a picture of a tiger.

1.1.2 Table

Table examples on WIKIBOOKS.

Table 1.1: Table Example 1

Start	End	Character Block Name
3400	4DB5	CJK Unified Ideographs Extension A
4E00	9FFF	CJK Unified Ideographs

Table 1.2: Table Example 2

Item		
Animal	Description	Price ($)
Gnat	per gram	13.65
	each	0.01
Gnu	stuffed	92.50
Emu	stuffed	33.33
Armadillo	frozen	8.99

Table 1.3: Table Example 3

Allocation	Allocation, Element, Type, Script
Data Types	Byte2, Byte3, and Byte4 Float2, Float3, Float4 Int2, Int3, Int4 Long2, Long3, Long4 Matrix2f, Matrix3f, Matrix4f Short2, Short3, Short4
Graphics	Mesh ProgramFragment, ProgramRaster ProgramStore, ProgramVertex RSSurfaceView

Table 1.4: Table Example 4

Team sheet		
Goalkeeper	GK	Paul Robinson
Defenders	LB	Lucus Radebe
	DC	Michael Duberry
	DC	Dominic Matteo
	RB	Didier Domi
Midfielders	MC	David Batty
	MC	Eirik Bakke
	MC	Jody Morris
Forward	FW	Jamie McMaster
Strikers	ST	Alan Smith
	ST	Mark Viduka

Table 1.5: Table Example 5

Team	P	W	D	L	F	A	Pts
Manchester United	6	4	0	2	10	5	12
Celtic	6	3	0	3	8	9	9
Benfica	6	2	1	3	7	8	7
FC Copenhagen	6	2	1	2	5	8	7

1.1.3   Verb

Let's take a overview on how to type special characters:

`<FRAMEWORKS_BASE>/graphics/java/android/renderscript`

[1] You could also go back to the beginning of the chapter by the **hyperref**.

1.1.4   Enumeration

1. Enumerated Item1

2. Enumerated Item2

3. Enumerated Item3

1.1.5   Code Display

Here is a "Hello, DanDing." example:

```
void main(int argc, char **argv)
{
    printf(" ´ _> ` ");
}
```

Another example with line numbers:

```
1  void main(int argc, char **argv)
2  {
3      printf(" ´ _> ` ");
4  }
```

Matlab example:

```
1  function y = demo(x) % This is a comment.
2      str = 'hello there';
3      y = x + 1;
4  end
```

---

[1]Path of <APP_intermediates>:   <ANDROID_ROOT>/ out/ target/ common/ obj/ APPS/ APP-NAME_intermediates/

4

1.1.6 Math

- Inline mode:

  The solution to $\sqrt{x} = 5$ is $x = 25$.

- Display mode:

  The solution to

  $$\sqrt{x} = 5$$

  is

  $$x = 25.$$

- Numbered mode:

  $$2 + 2 = 4 \tag{1.1}$$

- Non-numbered:

  $$2 + 2 = 4$$

- Aligning:

  $$
  \begin{aligned}
  2x^2 + 3(x-1)(x-2) &= 2x^2 + 3(x^2 - 3x + 2) \\
  &= 2x^2 + 3x^2 - 9x + 6 \\
  &= 5x^2 - 9x + 6
  \end{aligned}
  $$

- Fractions:

  $$\frac{n!}{k!(n-k)!} = \binom{n}{k}$$

- Matrix:

  $$
  A_{m,n} =
  \begin{pmatrix}
  a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\
  a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\
  \vdots & \vdots & \ddots & \vdots \\
  a_{m,1} & a_{m,2} & \cdots & a_{m,n}
  \end{pmatrix}
  $$

More examples on WIKIBOOKS.

1.1.7 Algorithms

Algorithm 1 Calculate $y = x^n$

Require: $n \geq 0 \vee x \neq 0$
Ensure: $y = x^n$
  $y \Leftarrow 1$
  if $n < 0$ **then**
      $X \Leftarrow 1/x$
      $N \Leftarrow -n$
  else
      $X \Leftarrow x$
      $N \Leftarrow n$
  end if
  while $N \neq 0$ **do**
      if N is even **then**
          $X \Leftarrow X \times X$
          $N \Leftarrow N/2$
      else[N is odd]
          $y \Leftarrow y \times X$
          $N \Leftarrow N - 1$
      end if
  end while

More examples on WIKIBOOKS.

Chapter 2

Introduction

HiHi Iam r44 . The organization of this thesis is as follows. In chapte **??**, the theoretical background and definition of surface plasmon will be included [1]. Chapte **??** contains description of experiment methods such as atomic force microscopy and scanning electron microscopy.

2.1   Thesis Overview

In this section, we describe the overview of this thesis.

Chapter 3

Related Works

HiHi Iam r44 . The organization of this thesis is as follows. In chapte **??**, the theoretical background and definition of surface plasmon will be included [1]. Chapte **??** contains description of experiment methods such as atomic force microscopy and scanning electron microscopy.

Chapter 4

Methodology

HiHi Iam r44 . The organization of this thesis is as follows. In chapte **??**, the theoretical background and definition of surface plasmon will be included [1]. Chapte **??** contains description of experiment methods such as atomic force microscopy and scanning electron microscopy.

4.1   Problem Setup

There are a query set $Q = \{q_1, q_2, ..., q_T\} \subset \mathbb{R}^D$ at the server P and a dataset $X_i \subset \mathbb{R}^D$ on each local machine M_i. For each coming query q_t, we want to find its k_{th} nearest neighborhood among these distributed datasets while reducing the transmission cost between P and each M_i.

4.2   Overall Framework

In this section, we describe the overall framework of our work. Then, we will give the details about the framework in the following sections.

There are two main phases in our framework. For each X_i, the first phase only needs to be done for once. On the other hand, we need to run the second phase for each new query q_t.

The goal of the first phase is to learn a othorogal matrix W_i for each X_i and then send

it back to P. We can find that this phase is only dependent on X_i and independent of q_t. Therefore, we could see this phase as a preprocessing procedure for each X_i. We give the details about how to learn W_i, how to send it back to P in the Sec 4.5.

The second phase is the main procedure of our framework. Note that P have already got W_i for each X_i in the beginning of the second phase. For each comming query q_t, we iteratively prune some candidates which are impossible to be the kNN of q_t to reduce the search space until there are only k candidates left.

To prune candidates iteratively, we divide the second phase into several rounds. For each round j, we use a $Select$ function $S_i(q_t, j; \theta_t)$ to generate the values for trasmitting from P to M_i, where S_i is the importance-selecting function of M_i and θ_t is its parameters for q_t. (We put the details of S_i at the Sec 4.4.) By these values, each M_i could calculate the bounds between each candidate x_l and q_t. With these bounds, P would be able to determine which candidates are definitely not our answer and then disregards them in the following rounds. By these pruning, we could achieve the goal of saving transmission cost from avoiding to consider the unnecessary candidates.

4.3 Prune by Bounds

In this section, we describe the method to prune the candidates by a threshold th.

4.3.1 Definition of Bounds

First, we need to define the bounds for the pruning. Recall that given a query q_t, our goal is to find its kNN in these distributed datasets X_i. Intuitively, we need to calculate the Euclidean distance $Dist(q_t, x), \forall x \in \cup_i X_i$. However, to cacluate $Dist(q_t, x)$, we need to send the whole q_t to the local machines or send the whole x to P, which causes a huge transmission cost. Therefore, instead of the exact value of Euclidean distances, our propsed framework uses bounds to find the kNN .

Definition 1. $\forall x, y \in \mathbb{R}^D$, *a lower bound* $LB(x, y)$ *and a upper bound* $UB(x, y)$ *must*

satisfy the following inequation:

$$LB(x, y) \leq Dist(x, y) \leq UB(x, y)$$

4.3.2 How to Prune the Candidates

For the query q_t, if we already know $LB(q_t, x)$ and $UB(q_t, x)$ $\forall x \in \cup_i X_i$, we could use the k_{th} largest upper bounds and directly prune those x whose lower bounds are higher than this value thr. I.e., we want to prune

$$\{x | LB(q_t, x) > thr, \forall x \in \cup_i X_i\}$$

where thr is the k_{th} largest $UB(q_t, x)$ $\forall x \in \cup_i X_i$.

Here is an example of the pruning procedure.

TODO: Draw the figure about pruning.

We will talk about the details to generate these bounds and find the threshold in the Sec haha.

4.3.3 How to Find the Threshold

The question now is to find the threshold thr for pruning. Since TODO: Put this section here or after derived the bounds.

4.4 Importance-Selecting Function

In this section, we describe the overview of this thesis.

4.5 Orthogonal Transformation

In this section, we describe the overview of this thesis.

4.5.1 Definition of Ortohogonal Transformation

Definition 1. *A matrix $W \in \mathbb{R}^{D \times D}$ is orthogonal if whose columns and rows are orthogonal vectors, i.e.*

$$W^T W = W W^T = I$$

where I is the identity matrix.

4.5.2 Property of Orthogonal Transformation

Property 1. *Let $x, y \in \mathbb{R}^D$, and $W \in \mathbb{R}^{D \times D}$ be an orthogonal matrix. Then,*

$$Dist(x, y)^2 = \sum_{d=1}^{D} (x[d] - y[d])^2 = \sum_{d=1}^{D} (W_d x - W_d y)^2 = Dist(Wx, Wy)^2$$

where W_d is the d_{th} row of W.

4.6 Enhance the Bounds by the Orthogonal Transformation

In this section, we describe the overview of this thesis.

4.7 Learn the Orthogonal Transformation

In this section, we describe the overview of this thesis.

Bibliography

[1] S.A. Maier. *Plasmonics: fundamentals and applications*. Springer Verlag, 2007.