



THE UNIVERSITY OF HONG KONG 香港大學
faculty of architecture 建築學院



iLab | @HKURBAN
the urban big data lab

Tips for New Researchers

15 mins to sharpen your 'teeth' for research at HKU

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Section 1

FIREFOX

TIME IS MONEY, FRIEND.



1.1 Automating full-text paper access via HKUL



◆ HKU Library

- ▣ Brings you almost any paper, including CNKI etc.
- ▣ Principle: Proxy via “.eproxy.lib.hku.hk”

◆ The good

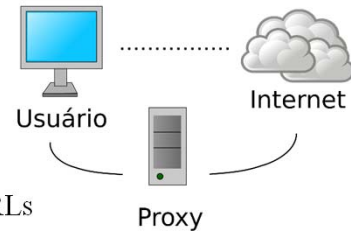
- ▣ Firefox: Install “Redirector,” set rules to the publishers’ URLs
 - Full text available in no wait 🙌🙌
- ▣ Chrome: Install the “Reload via HKUL” add-on (🙌 need one mouse click for every paper)

◆ The bad

- ▣ Login Library System, find publisher/indexer, search ... etc.

◆ The ugly

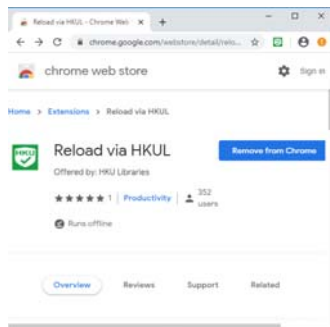
- ▣ Sci-Hub: Search for doi (🙌 needs doi first)



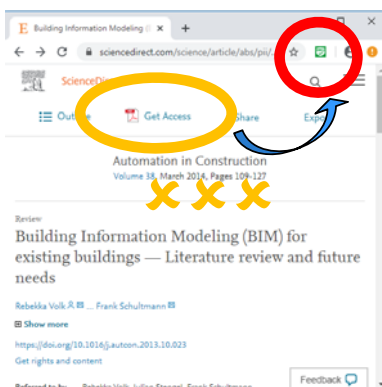
1.1 Step-by-step guide (Chrome)



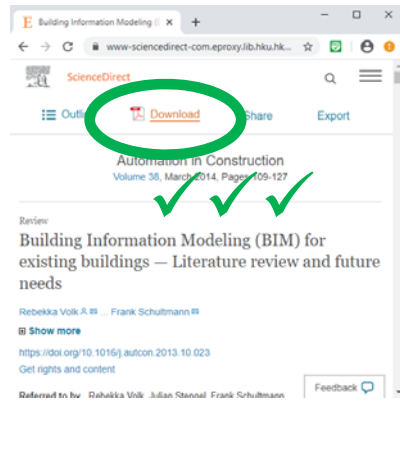
◆ 1. Install ‘Reload via HKUL’ add-on



◆ 2. Click this green button in front of a paywall



◆ 3. Type your HKU ID, and download full-text

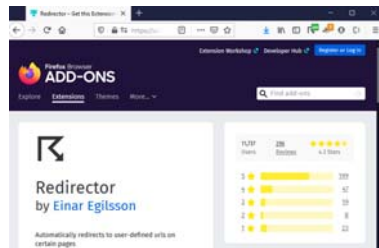




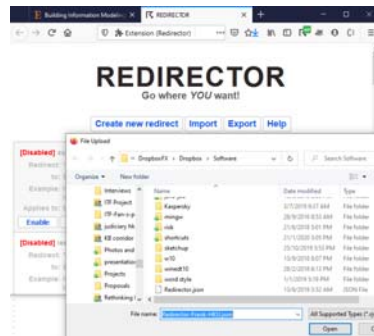
1.1 Step-by-step guide (Firefox)



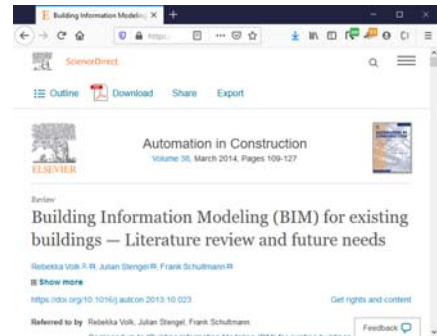
1. Install the 'Redirector' add-on to Firefox



2. Download and import [this JSON file](#)



3. Auto jump to full-text (HKUL log-in once a day)



1.2 Try Google before calculator, sometimes



Type in browser's address bar (Google as engine)

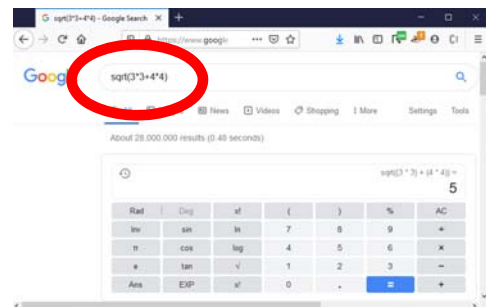
- ▣ =sqrt(3*3+4*4)
- ▣ =100*cm/inch
- ▣ =100*HKD/RMB
- ▣ =1*lightyear/km

◆ [Google Image search](#)

- ▣ Options: "reuse with modification," "size: icon"

◆ Inverse image search

- ▣ Click the "camera" icon
 - Fine resolution images/ original sources



***: MS Office 365 is free from <http://office.com> using your HKU account.**

Section 2
EXCEL*

I CAN DO IT



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2.1 Gearing up: Formula



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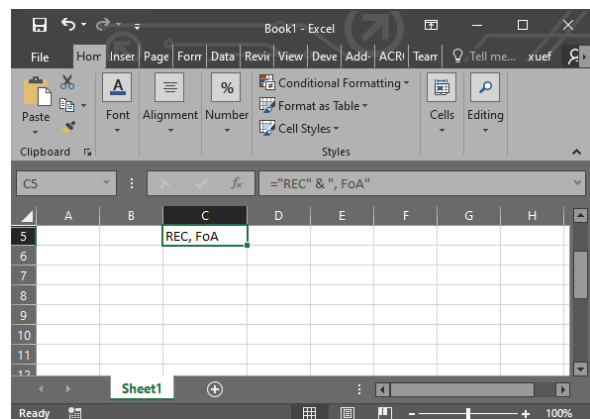
◆ String (enclosed by double quotes)

- ▣ “a”, “Adam”, “Hello world!”, “ ” (space), “↵” (enter/change line)

◆ String formula

- ▣ =“REC” & “, FoA” → “REC, FoA”
- ▣ =istext(A1)
- ▣ =left(“Hello world”, 5) → “Hello”
- ▣ =mid(“Hello world”, 3, 3) → “llo”
- ▣ =search(“llo”, “hello”) → 3
- ▣ =substitute(“Hello world”, “llo”, “llllo”)

◆ Practice: [Click me](#)





2.1 Gearing up: Formula (cont.)



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◆ Numbers (starts with a number)

- ▣ 1.0, .2, 1.00E+5

◆ Numerical formula

- ▣ =A1*B1
- ▣ =sqrt(power(A1,2)+power(B1,2))
- ▣ =isnumber(A1)
- ▣ =abs(A1)
- ▣ =acos(A1) ... sin/cos/tan/atan/acoth/log/ln/...
- ▣ =mod(5, 2) → 1
- ▣ =roundup(5.5) ... rounddown(5.5)



2.1 Gearing up: Formula (cont.)



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◆ Vector / sequence

- ▣ A1:A2, \$A\$1:\$A\$2,

◆ Numerical formula

- ▣ =average(scores)
- ▣ =averageif(scores, ">90")
- ▣ =averageifs(scores, teachers, "Dr. Adam", class, "K2A")
- ▣ Sum, mean, max, min, count, percentile, stdev, sumproduct ...
- ▣ =match(100, A\$1:A\$100)
- ▣ =index(A\$1:A\$100, 5)
- ▣ =lookup(100, A\$1:A\$100, B\$1:B\$100)
- ▣ =rows(A1:A100)



2.2 Excel charting tips



◆ Using appropriate type of chart

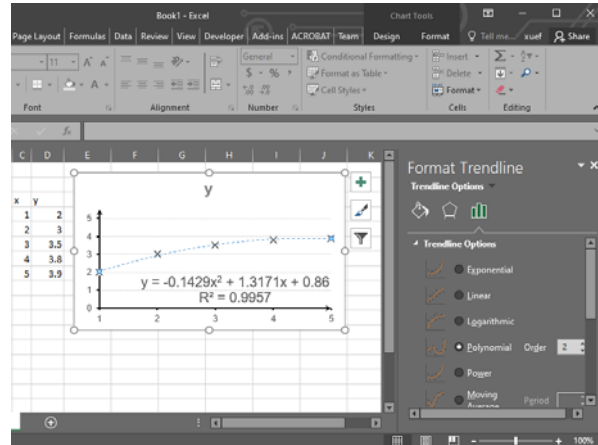
- ▣ Box/whisker chart
- ▣ Xy-scatter

◆ Regression analysis

- ▣ Right click a point in XY-scatter
- ▣ “Add trend line” – “Display equation”

◆ In a professional style

- ▣ Line thickness: 0.75 - 1pt
- ▣ Using color/pattern filling
 - Checking gray-scale for publishing
- ▣ Remove unnecessary boundary/margins



2.3 Game in Excel: 田忌賽馬



◆ You are 田忌

- ▣ About 350 B.C., from the Kingdom *Chi* in the Warring States Period of ancient China (Sima 91B.C./2010, pp. 01.761–01.762)

忌數與齊諸公子馳逐重射。孫子見其馬足不甚相遠，馬有上、中、下輩。於是孫子謂田忌曰：「君弟重射，臣能令君勝。」田忌信然之，與王及諸公子逐射千金。及臨質，孫子曰：「今以君之下駟與彼上駟，取君上駟與彼中駟，取君中駟與彼下駟。」既馳三輩畢，而田忌一不勝而再勝，卒得王千金。

◆ You are given 3 inferior horses

- ▣ to win King in 3 racing matches
 - Try this with EXCEL solver

◆ Key: [Click me](#)





2.4 Game in Excel: Dido of Carthage



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◆ You are Queen Elissa (Dido of Carthage)

- ▣ Roman poet Virgil recorded a legendary story in the foundation of Carthage by around 800 B.C.: [English] (Virgil, 29-19B.C./1893, p14)

So to the place they came, where now thou spyest
The lofty walls and rising citadel
of new-built Carthage, and of land they bought ---
Called Byrsa from their bargaining --- so much
As with a bull's hide they might compass round.

◆ You are given a fix length of bull's hide,

- ▣ Maximize your land which you can compass round.

◆ Key: [Click me](#)



Ruins of Carthage (from Wiki, CC-BY)



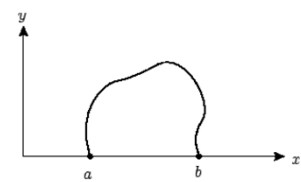
2.4 The isoperimetric problem



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◆ This *isoperimetric problem* of enclosing the maximum area with a given perimeter is now also known as *Dido's problem* (e.g. Merrill, 1919).

- ▣ The solution in this case, with the Mediterranean coast as a given edge, is a semicircle (Hackley, 1847, Appendix I, Theorem IV).
- ▣ Someone said that the cunning Queen Elissa cut the bull hide into very narrow strips and circumscribed a maximized size of land in a *semicircle*.
 - Concave must be dominated by convex
 - Uneven edge polygon must be dominated by an even one
 - Let do the rest in EXCEL!



$$\max J(y) = \int_a^b y(x) dx$$

$$\int_a^b \sqrt{1 + (y'(x))^2} dx = C_0$$

$$y(a) = y(b) = 0$$



2.5 More tips



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◆ Sorting/filtering

- ▣ Data – Sort & filter – filter

◆ Remove duplicates

- ▣ Data – Sort & filter – advanced – copy to – check [unique]

◆ Swap table's xy

- ▣ Copy – paste special – transpose

Section 3

R

I HAVE PRO GRAPHICS



3.1 R



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◆ R

- ▣ R-project.org
- ▣ (One of) the most popular scientific language

◆ Competitors

- ▣ Excel
- ▣ SPSS
- ▣ Python

◆ Formal introduction

- ▣ Book: R for beginners
- ▣ https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf



3.2 You can use R without programming



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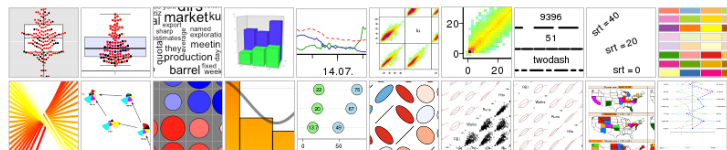
◆ Install 'rattle' package

- ▣ `> library(rattle)`
- ▣ `> rattle()`
- ▣ Try 5-data_rfid.csv

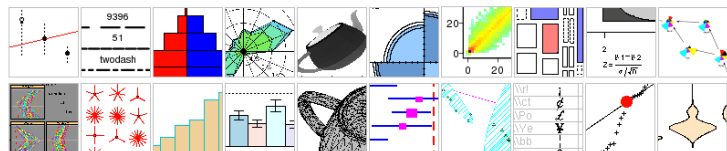
◆ More charts for your exploration

- ▣ <https://plot.ly/r/>
- ▣ rCharts

» Last entries ...



» Random entries



Section 4 C# FOR REVIT

YET ANOTHER LEGO GAME

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4.1 Start



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◆ Prerequisite

- ▣ Revit 2015+
- ▣ Visual studio 2015 or 2018
- ▣ Not on readonly PCs

◆ Language

- ▣ Either C#, C++, or Visual Basic (as those in Excel VBA)

◆ Principle

- ▣ a .Net CLR dll library
- ▣ Implements Revit's superclass



4.2 Official guide



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- ◆ Download “Visual Studio 2015 Revit 201X Add-in Wizards” from “thebuildingcoder”
- ◆ [Lesson 1: The Basic Plug-in](#)
- ◆ [Lesson 2: Programming Overview](#)
- ◆ [Lesson 3: A First Look at Code](#)
- ◆ [Lesson 4: Debugging your code](#)
- ◆ [Lesson 5: Simple Selection of a Group](#)
- ◆ [Lesson 6: Working with Room Geometry](#)
- ◆ [Lesson 7: My Final Plug-in](#)
- ◆ [Lesson 8: Learning More](#)



Keep awesome!