Data Leaks, Data Industry, Social Engineering & OSINT

RZ Pan @ ZJU AAA

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Current Situation

https://www.varonis.com › ... › Data Security ▾ 翻译此页

98 Must-Know Data Breach Statistics for 2021 | Varonis

2021年4月16日 — How Do Data Breaches Occur? Recent Data Breaches + Statistics; COVID-19 Specific Data Breaches; Breaches by the Numbers; Cost of a Data ...

How Do Data Breaches Occur? · Data Breach Risk · Historical Data Breach...

https://www.securitymagazine.com › articles ▾ 翻译此页

The Top 10 Data Breaches of 2020 | 2020-12-03 | Security ...

2020年12月3日 — Recent data from Risk Based Security revealed that the number of records exposed has increased to a staggering 36 billion in 2020.

https://www.upguard.com › blog › biggest-dat... ▾ 翻译此页

The 56 Biggest Data Breaches (Updated for 2021) | UpGuard

Our updated list for 2021 ranks the 56 biggest data breaches of all time, ... list of the 56 biggest data breaches in history, including recent data breaches in 2021. ... was the result of a data leak on a system run by a state-owned utility company.

Aadhaar data breach · Starwood (Marriott) data... · Sociallarks data breach

Entity	Year	Records
Microsoft Exchange servers	2021	unknown
Animal Jam	2020	46,000,000
Betsson Group	2020	unknown
Capcom	2020	350,000
CheckPeople	2020	56,000,000
Clearview AI	2020	unknown (client list)
FireEye	2020	Unknown
Unknown	2020	201,000,000
Instagram	2020	200,000,000

Current Situation

- Does that necessarily affects my own life?

- Yes, of course!

Cu

June 30, 2022, 08:55 AM (This post was last modified: Yesterday, 10:25 AM by Muffin. *Edit Reason: Locked by staff due to all the spam*)

In 2022, the Shanghai National Police (SHGA) database was leaked. This database contains many TB of data and information on Billions of Chinese citizens.

Sell: Shanghai GOV (SHGA.gov.cn) National Police Database

Host: **http://oss-cn-shanghai-shga-d01-a.ops.ga.sh/**
Data leaked from these tables:

```
----TABLES----
person_address_label_info_slave QFpD25bKTJ2eQBxcbe2Aaw 90 0 546148916 0 172.2gb 172.2gb
nb_theme_address_merge_tracks_slave -bUMVB1uRRusUbbqZepEpA 300 0 37483779369 4 22.4tb 22.4tb
nb_theme_address_case_dwd_test 7COIWTt7QU-YPwWub8z_SQ 150 0 22375506 1749307 25.2gb 25.2gb
nb_theme_address_company_dwd-total fpnmEYB9SI6WevHnZIEwIA 150 0 1842856 0 2.8gb 2.8gb
nb_theme_address_case_dwd-total 7X8oNqULQnWFLpzHDaUTbg 150 0 1214119253 0 1tb 1tb
nb_theme_address_company_dwd_test g5f6l4LGQcGL3oQ6ON2Bbw 150 0 2017931 0 4.3gb 4.3gb
person_address_label_info_master t64pp9WnS3maY9jBjzTtiw 90 0 969830088 0 282.8gb 282.8gb
```

Data Details:

Databases contain information on 1 Billion Chinese national residents and several billion case records, including:
- Name
- Address
- Birthplace
- National ID Number
- Mobile number
- All Crime / Case details

Yesterday, 08:22 AM

> **UNDERTALEFANS Wrote:**
> b站请关注嘉然今天吃什么

加载中~
show show way

1.7亿条学生信息遭泄露?学习通报警!曾一年被披露三次漏洞

2022年6月23日 随后，“学习通”话题一度登上微博热搜第一。当日下午，超星学习通官微就此事回应表示，尚未发现明确的用户信息泄露证据，已经向公安机关报案，公安机关已介入调查。但自6月21日以...

北京时间财经 百度快照

网易邮箱又被脱裤啦,大家注意修改密码 - 糯米PHP

2017年6月26日 全球工单系统 网易邮箱又被脱裤啦,大家注意修改密码这两天一直给我发邮件提示登录失败,上去看了下 IP 发现各地都有。图中香港和第一个四川是我自己登录的,其他...

糯米PHP 百度快照

网易数据库被脱裤,应该怎么保护好自己的邮箱账号? - 知乎

2015年10月20日 3，考虑到脱裤问题，以及国内企业把密码仅仅md5存储的尿性(那些明文存储请呼叫赵日天，龙傲天，福尔康，...

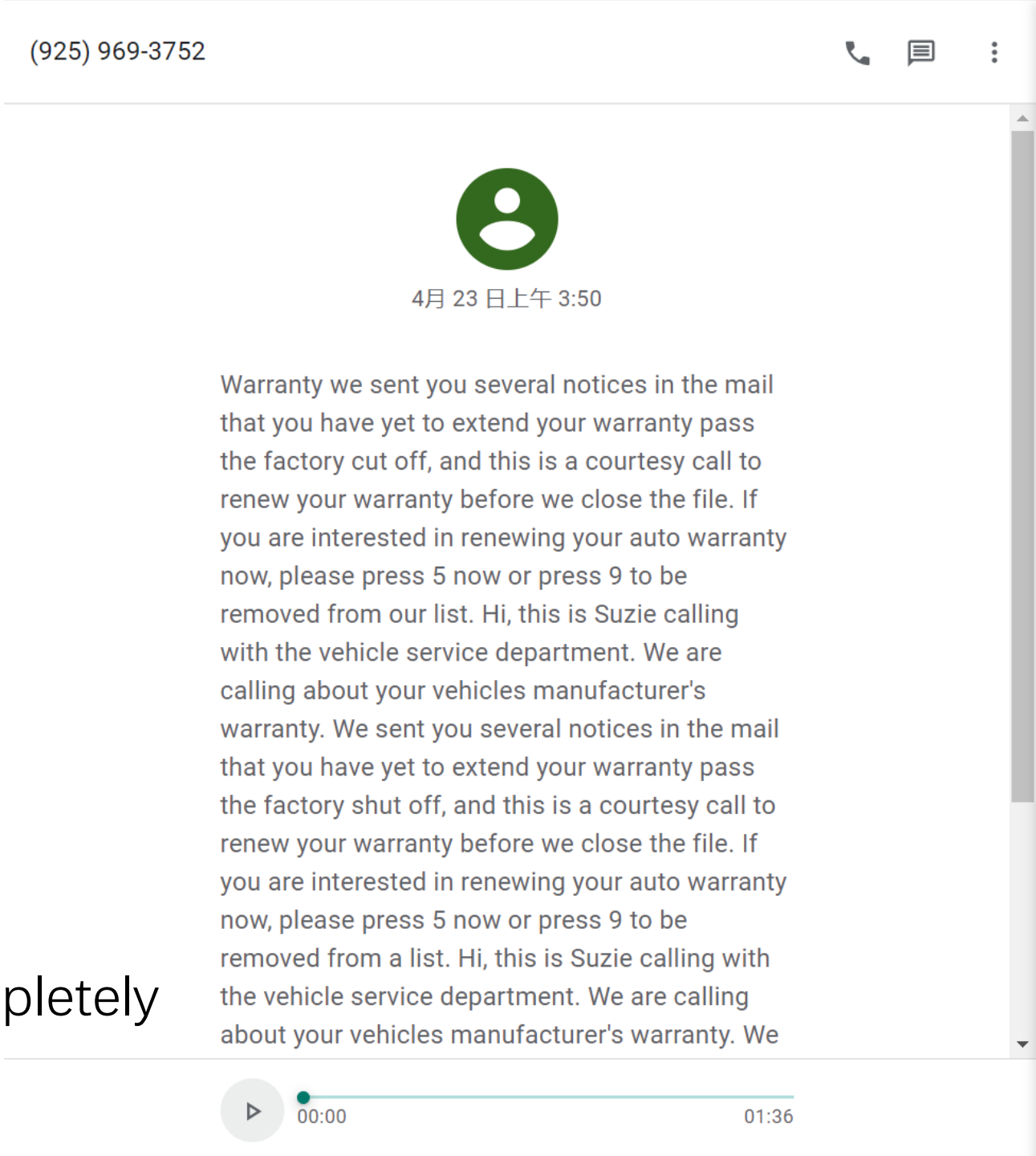
知乎 百度快照

A Typical Spam Call

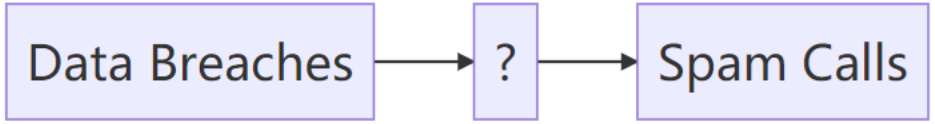
- AI generated audios (TTS)
- Robot-controlled virtual phone

- To mitigate:
- Make use of Google assistant
- Robots can chat with robots
- No living creatures involved

- ...But this can't solve the issue completely



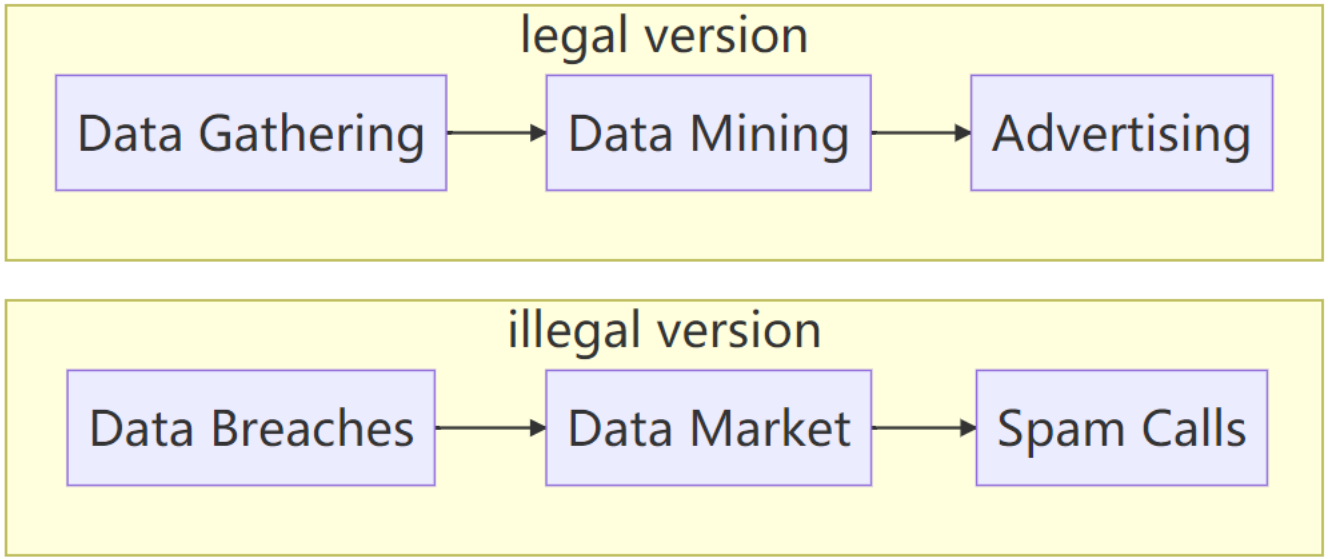
Model



- How did those spammers get my phone numbers?
- Where did those spammers buy leaked data?

- These questions lead to the concept “Data Industry”

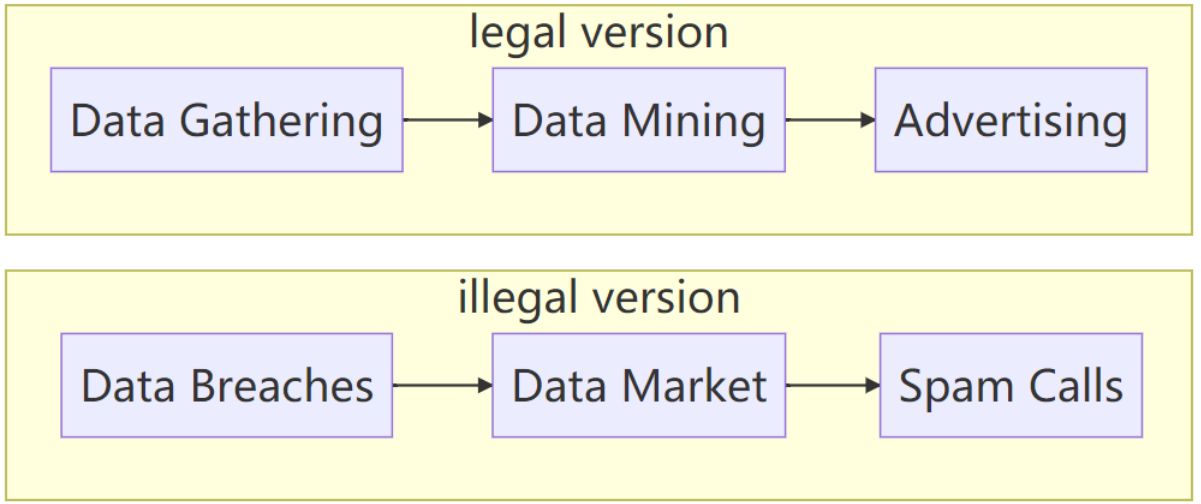
Data Industry: Structure



Data Industry: Structure

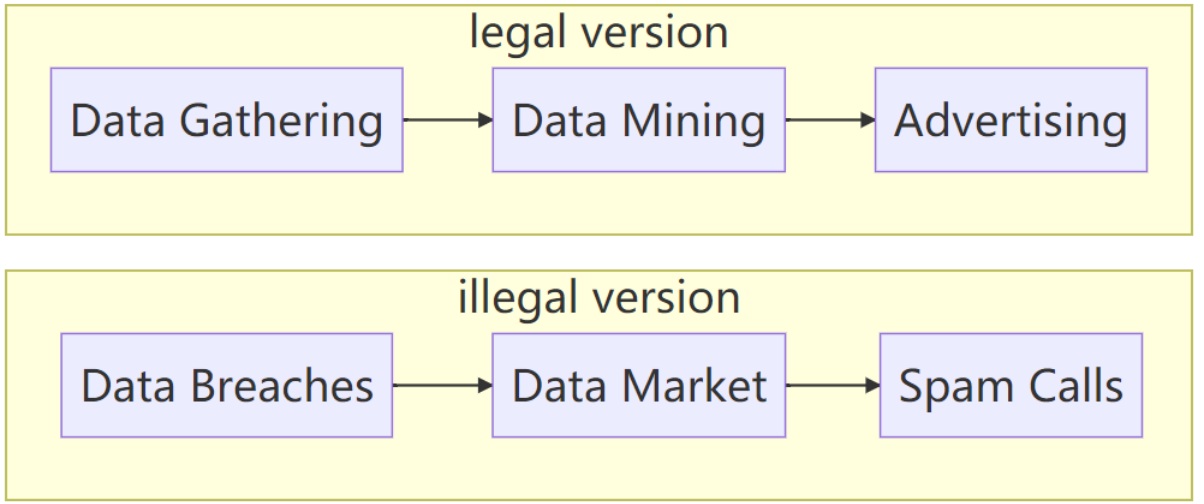
- Data Gathering:

- Big enterprises
- Gathered from their own services
  - Navigation data
  - Preference data
- User-targeting or anonymized



Data Industry: Structure

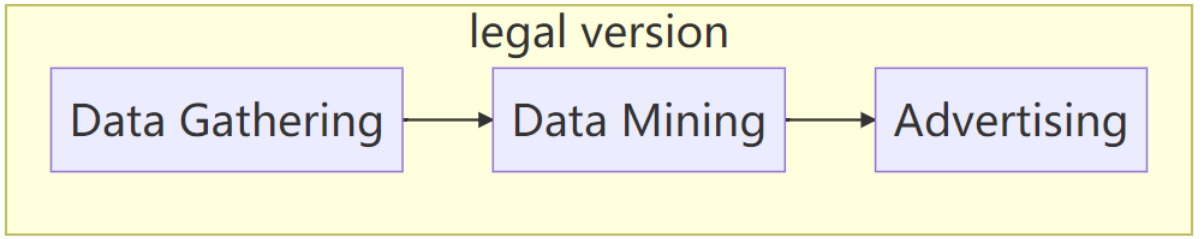
- Data Mining & Advertising:
- Discover and gain profits from data



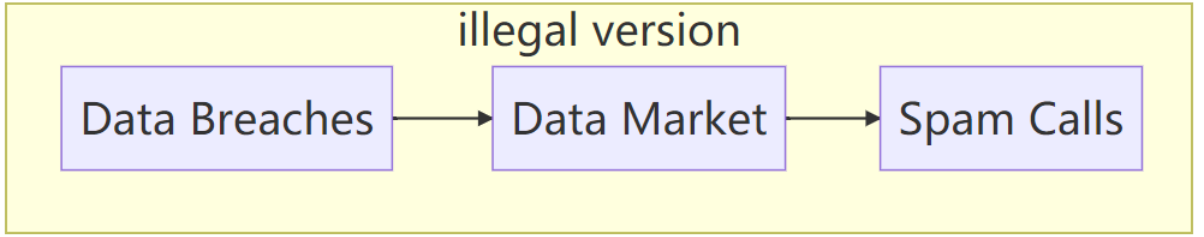
- Classify your users
- Better timeline waterfall
- Targeted ads
  - Youtube
  - Tiktok

Data Industry: Illegal Parts

- Data Market:
- Place to sell & buy leaked data



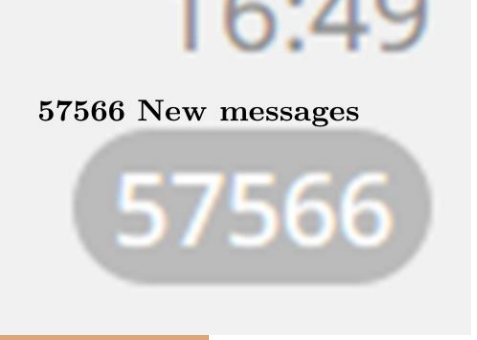
- Deep / Dark Web?
- Onion Browser (Tor Browser)?



- Encrypted IM Apps: Telegram, Signal (smaller market)

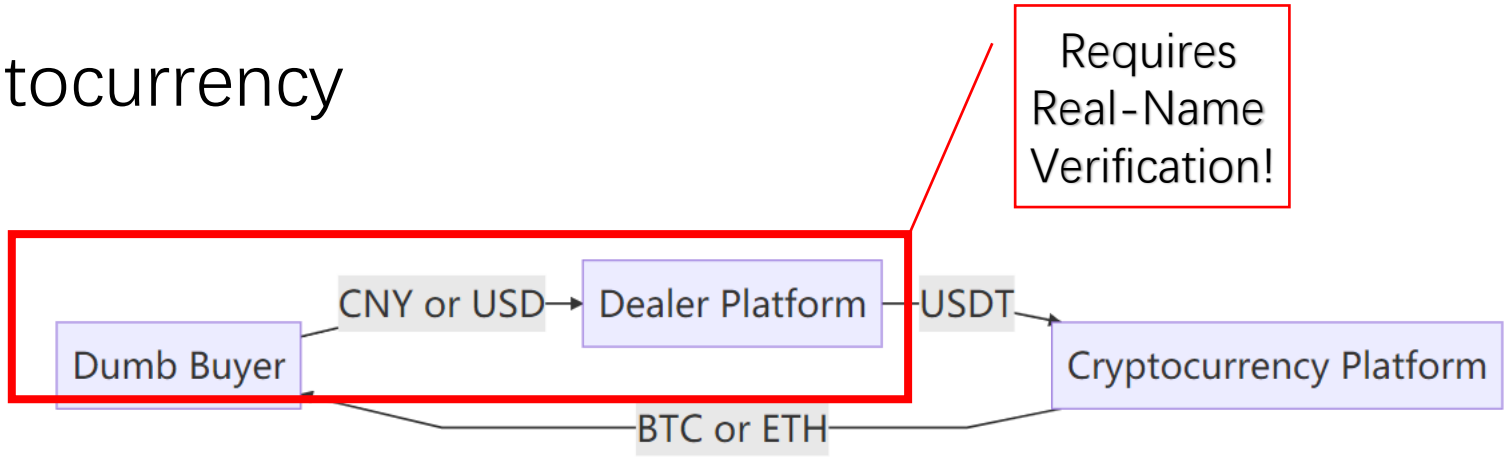
A Relatively Small Market on TG

- Operates quite the same as those dark web sites
- Offers example data (~1% of leaked) for buyers to check before payment
- Only accept cryptocurrency



Typical Method of Avoiding Regulation

- Cryptocurrency



- Needs some “camouflage”:

- Now that we know where & how to buy leaked data (at least theoretically), let’s see what we can do with it

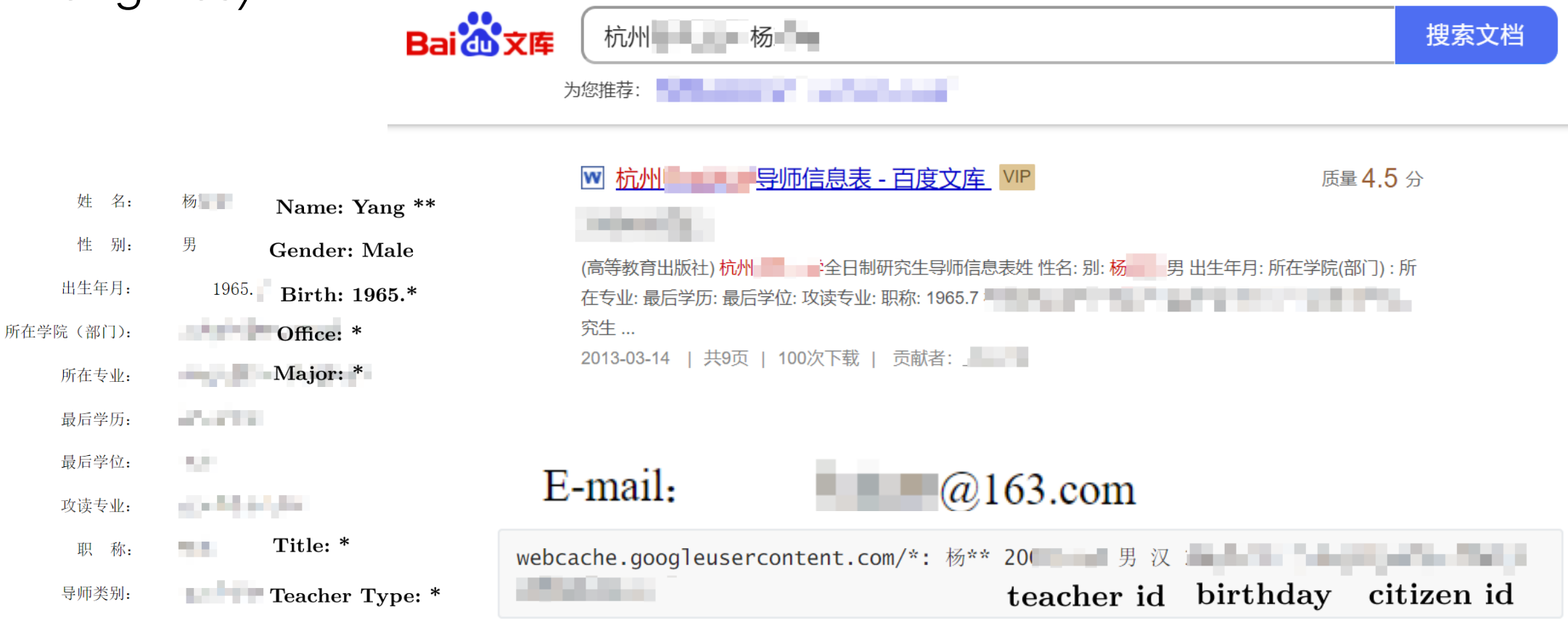
Social Engineering

- Simply pick a random poor guy from a random university
- Let's call this guy "Prof. Yang" from The Random University.

- *Caution: This is actually an **authorized** experiment carried out by a professional pentest team. Trying to reproduce this might lead to violation of relative laws, and you may be sued due to such attempts.*

Social Engineering

- First, gather as much information about him as we can (via search engines):



Social Engineering

- First, gather as much information about him as we can (via university websites):
- Usually we can only get masked info at this step, i.e. 138****0001

- Phone number:

  `[call service provider][register location number][4 random numbers]`

- Citizen id:

  `[born city id][province id][birthday][3 random numbers][validation number]`

Social Engineering

- Next, try to gain access to his email account *****@163.com
- Use “manual recover”
- Photoshop a fake citizen id card (this is illegal)
- Personal photo leaked from a school card management website
- Name, Birth, Gender leaked from search engine
- Citizen id and home address leaked from TG Market (**Definitely illegal!!! Authorized**)
- Netease Inc. (operates mail.163.com) will manually review this request

Social Engineering

- Netease failed to notice that the id card image was generated
- They decided to reset the email's password for us
- At the same time: We also phone called the Random University's IT department to reset Prof. Yang's another email (school email)'s password (of course this is illegal)
- The IT department was also cheated easily
- Now the team have access to both emails, which contain many important data & forms, and we can reset his passwords on nearly every websites as we controlled his accounts' recovery email
- Result: the team can login to more platforms for further steps (i.e. pentest & attack), the Random University is more vulnerable now

Social Engineering

- Near-source pentesting

我们出发时本来想先挂一个号，然后在大厅里慢慢搞，但计划赶不上变化，到达医院进门后，在大厅里一个人没有，什么缴费，预约啥的都没有人，没人不就更好办了，先在大厅和二楼转了一圈，没发现可以直接插网口的地方，回到一楼的后，发现门口左右两边有两台报告打印机都是连接着网线，一台没开机，一台已开机了，心想这不简单了嘛，网线插入没开机的那台网口就好了；

前进的道路总不会那么平坦，带的网线不够长，苍天绕过谁，没办法，出去买了个两米的网线，这下总该没没问题了吧，并不是想象中那么简单，md，自动获取 IP 还是没网，心里想完了；

不甘心啊啊啊啊啊，跟另外一个同事商量，纠结了一阵子，把那台好的报告打印机给拔了，并且找好了一个理由，有人问我们的话，就说是调整网络的，因为左边那台坏机子网络不通，说整就整，看了下这台打印机的IP，拔掉网线，连入自己的电脑，配置完成后，成功接入到网络中，愉快的开扫

Social Engineering

- Near-source pentesting
  - Fake id card
  - Duplicated RFID / NFC tag
  - As food deliverer, driver, tube repairer, etc.
  - Use photograph to cheat face recognition

Conclusion

- If one has enough information about you, they can easily become you (at least on the Internet). For others, it's hard to distinguish, and this may lead to severe money loss (i.e. your (fake) friends want to borrow money from you).

- Of course, this is illegal; but under the current law framework, seldom can be done to prevent these things from happening, so at least you should know where the threaten is coming from.

- Or, maybe you can find some better solutions for this issue!

Self Protection

- Random passwords
- Use a password manager
  - Chrome / Edge
  - Bitwarden, 1Password, etc. (Recommended)

Self Protection

- Check for leaked passwords

Google <no-reply@accounts.google.com>
重要安全提醒

您保存的密码中有一些已在网上外泄

系统检测到，由于您使用的某个网站或应用发生数据泄露事件，您的某些已存密码遭到外泄。不过，您的 Google 帐号未受影响。
为了保障您的帐号安全，Google 密码管理工具建议您立即更改密码。
检查密码
您也可以访问以下网址查看安全性活动：
https://myaccount.google.com/notifications
我们向您发送这封电子邮件，目的是让您了解关于您的 Google 帐号和服务的重大变化。
© 2022 Google LLC, 1600 Amphitheatre Parkway, Mountain View, CA 94043, USA

21:56

Self F

- Check

Google <no-r
重要安全提醒

您保存的密码中有
[redacted]
系统检测到，由于
些已存密码遭到外
为了保障您的帐号
检查密码
您也可以访问以下
https://myaccou
我们向您发送这封
务的重大变化。
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密码安全检查

已检查 151 个网站或应用的密码

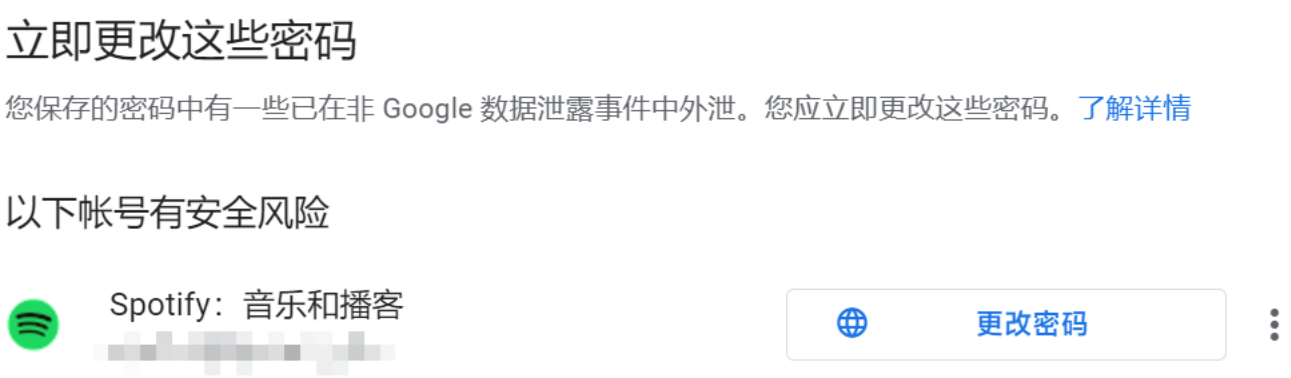
1 个密码遭外泄
立即更改这些密码

有 91 个重复使用的密码
创建独一无二的专用密码

有 75 个帐号使用了安全系数低的密码
创建安全系数高的密码

查看、更改或移除您保存在 Google 帐号中的密码。转到密码管理器

Self Protection



Self Protection

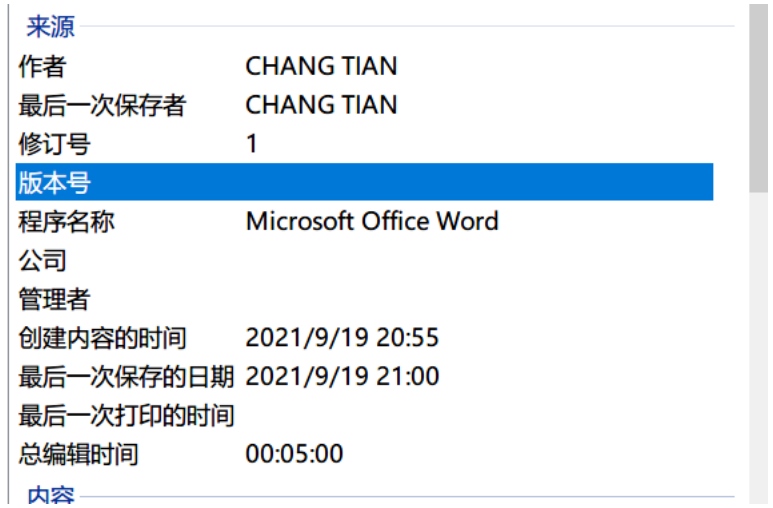
- Avoid accidentally leaking personal related info on the Internet

A Guide to Eliminate Your Personal Info from Your Report

RZ Pan @ ZJU AAA

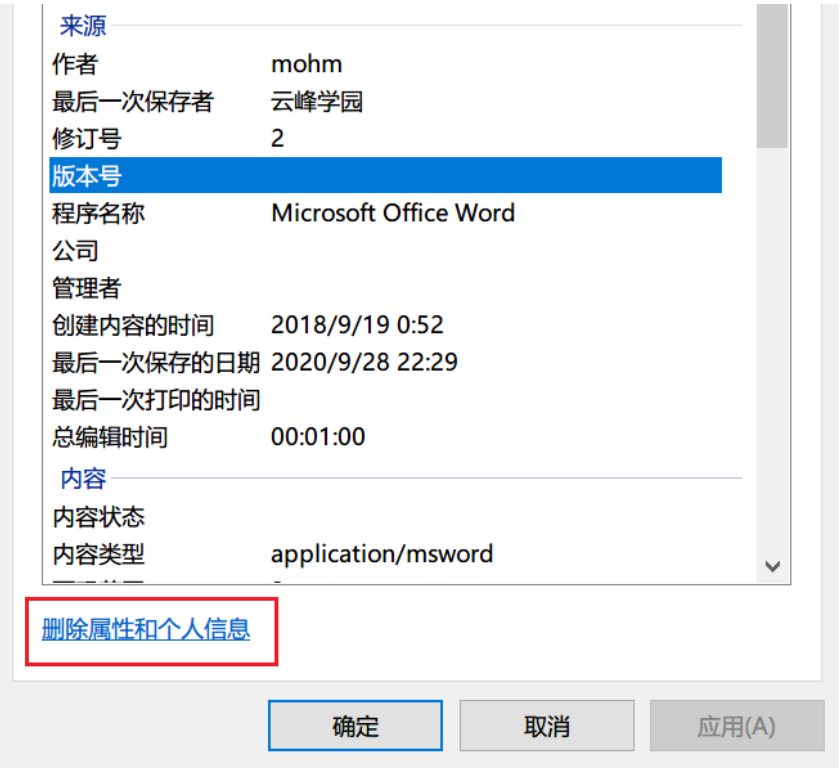
MS Word/PPT/Excel

- “Author” attribute
- “Last Modified By” attribute



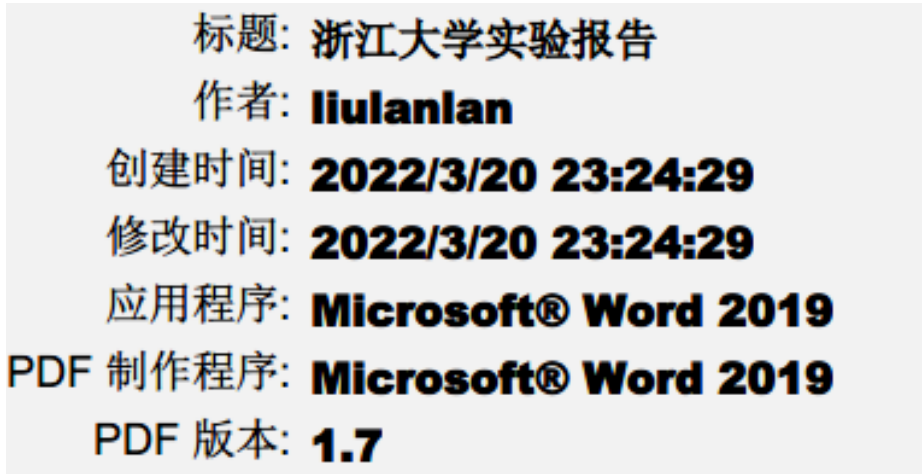
- Right-click on the file, “Attribute (R)”, Click on the “Details” Tab

- Solution: Click “Remove Attribute and Personal Info” which can be found at the bottom of the “Details” Tab
- Don’t make further edit, or you’ll need to clear these attributes again!



PDF

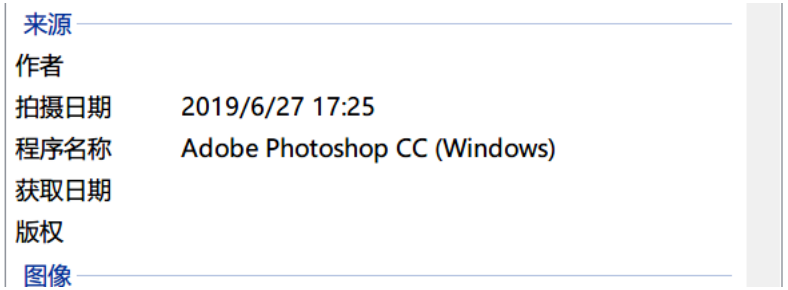
- “Author” attribute
- Open the file, and check its attributes/properties in your PDF viewer
- PDFs generated by MS Word:



- Solution: Click “Remove Attribute and Personal Info” before generating PDF
- Solution: Use a PDF metadata editor to delete these metadata
- Solution: Use Typora or LaTeX

Image

- JPEG EXIF –Solution: Ditto
  - Shot on a phone: GPS Info, phone manufacturer, etc.
- Screenshots might contain sensitive information, such as the path of your .exe (shown in **cmd** title bar)




```
$ strings 1.jpg | head -n 11
Adobe
'JExif
NIKON CORPORATION
NIKON D7200
Adobe Photoshop CC (Windows)
2019:07:10 23:07:41
0221
2019:06:27 17:25:44
2019:06:27 17:25:44
8120437
105.0 mm f/2.8
```

Visual Studio

- .sln, .vcxproj, -.filters, -.user
  - (Possible) IncludePath attribute
- .vs folder
  - (Possible) slnx.sqlite database, can be opened with sqlite3
- Debug folder
  - Name.log
  - **Name.pdb**
- Solution: Delete Debug/, double-check .sln & .vs/, etc.

```
<PropertyGroup Condition="'$(Configuration)|$(Platform)'=='Debug|Win32'">
    <LinkIncremental>true</LinkIncremental>
    <IncludePath>$(VC_IncludePath);$(WindowsSDK_IncludePath);.\include\</IncludePath>
  </PropertyGroup>
```

	FileSystemEntityId	Name	ParentFileSystemEntityId	IsFile	LastObserved
	过滤	过滤	过滤	过滤	过滤
1	1	.vs	NULL	0	637542385807238237
2	2	drawutil.c	NULL	1	637542385807238237
3	3	include	NULL	0	637542385807238237
4	4	libgraphics	NULL	0	637542385807238237
5	5	main.c	NULL	1	637542385807238237
6	6	exception.h	3	1	637542385807238237
7	7	extgraph.h	3	1	637542385807238237
8	8	gcalloc.h	3	1	637542385807238237

exp07.log - 记事本

文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

```
  main.c
d:\work\code\c\graphic\exp07-2\main.c(101): warning C4090: “函数”: 不同的“const”限定符
d:\work\code\c\graphic\exp07-2\main.c(117): warning C4090: “函数”: 不同的“const”限定符
d:\work\code\c\graphic\exp07-2\main.c(143): warning C4090: “函数”: 不同的“const”限定符
d:\work\code\c\graphic\exp07-2\main.c(153): warning C4090: “函数”: 不同的“const”限定符
  exp07.vcxproj -> D:\Work\Code\C\graphic\exp07-2\Debug\exp07.exe
```

17	17	graphics.c	4	1	637542385807238237
18	18	imgui.c	4	1	637542385807238237
19	19	random.c	4	1	637542385807238237
20	20	simpio.c	4	1	637542385807238237
21	21	strlib.c	4	1	637542385807238237
22	22	exp07.vcxproj	NULL	1	637542386318574471

PDB: cvdump.exe

```
PS D:\Work\Code\C\graphic\exp07-2\Debug> .\cvdump.exe .\exp07.pdb | grep Module: | grep -v from
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\main.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\strlib.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\simpio.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\random.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\imgui.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\graphics.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\genlib.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\exception.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\drawutil.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\main.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\strlib.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\simpio.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\random.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\imgui.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\graphics.obj"
** Module: "D:\Work\Code\C\graphic\exp07-2\Debug\genlib.obj"
```

Solution: don’t submit a debug build, and don’t forget to delete Debug/

Dev C++

- .dev file is just a simple plain-text file

```
[Project]
FileName=expSort.dev
Name=expSort
Type=0
Ver=2
ObjFiles=
Includes="D:\Work\Code\C\graphic\exp08 - 副本\include"
```

- Solution: Double-check .dev file, make sure no absolute path is included

Visual Studio Code

- .vscode folder: *.json, *.log

```
"miDebuggerPath": "C:\\Program Files\\mingw-w64\\x86_64-8.1.0-posix-seh-rt_v6-rev0\\mingw64\\bin\\gdb.exe",
"args": [
        "${workspaceFolder}\\task2\\libgraphics\\exception.c",
        "${workspaceFolder}\\task2\\libgraphics\\genlib.c",
```

- Might contains sensitive info
- Solution: Delete .vscode/ before submitting

.DS_Store (macOS)

```
$ ds_store_exp.py http://hd.zj.qq.com/themes/galaxyw/.DS_Store
hd.zj.qq.com/
└── themes
    └── galaxyw
        ├── app
        │   └── css
        │       └── style.min.css
        ├── cityData.min.js
        ├── images
        │   └── img
        │       ├── bg-hd.png
        │       ├── bg-item-activity.png
        │       ├── bg-masker-pop.png
        │
```

- Solution: Delete .DS_Store file before compressing/uploading your file

.md

- If you use specific platforms as your image bed, your personal info might be leaked
  - Retrieve weibo uid (--> user homepage) from image link
  - https://www.cnblogs.com/idjl/p/9610593.html
- Or, you use your self-hosted image bed
  - image.me.com --> me.com, blog.me.com, ……
  - site:me.com inurl:me.com
- Also, .md might leak path info if you import any image by specifying its absolute path
  - Example: ![Image](C:\Users\username\Desktop\MyImage\1.jpg)
- Solution: Submit .pdf, not .md

Git

- .git folder
  - upstream url: can get your GitHub/Gitlab account
  - Username & email if you use **`git config --local`**
  - Also, **`git log`**

- Solution: Delete .git

Conclusion

- Submit less files
- Use pdf if possible
  - Be careful about metadata in PDFs generated by MS Word
- If you have to submit Word/PPT/Excel, see page 3 for steps to create an anonymous copy

Self Protection

- Sharing image:
- Use proper mask / mosaic, don’t send raw copy, and crop out as much as you can

Self Protection

yml 配置 (保密原因自我补全)

```yaml
# datahub配置文件
public:
  datahub:
    # 配置信息
    config:
      #控制器
      startup: false
      #应用服务器地址
      endpoint:  XXXXXXXXXXXXXXXXXXXXXXXXXXXX
      #用户权限accessId
      accessId: XXXXXXXXXXXXXXXX
      #用户权限accessKey
      accessKey: XXXXXXXXXXXXXXXx
      serivce:
        #应用名称
      - projectName: XXXXXXXX
        #应用消费—topic名称
        topicGet: XXXXXXXXXXXXXXXXX
        #应用生产—topic名称
        topicSet: XXXXXXXXXXXXXXXXX
        #topicid的订阅ID
        subId: XXXXXXXXXXXXXXXXX
```

send raw copy, and crop out as

```
    /*public static void main(String[] args) {
        // Endpoint以Region: 华东1为例，其他Region请按实际情况填写
        String endpoint = "https://datahub.cn-shanghai-shga-d01.dh.alicloud.ga.sh";
        String accessId = "0iWV0NCs805VuAAu";
        String accessKey = "iEwlgpCnXDwT93YMVDb2G60my9ne81";
        String projectName = "sjc_rwzx";
        String topicName = "task_center_platform_request";
        RecordSchema schema = new RecordSchema();

```

Self Protection

- Sharing image:
- Use proper mask / mosaic, don’t send raw copy, and crop out as much as you can
- DingTalk screenshots: phone + name watermark
  - Double-check before sending
- Raw copy contains metadata
  - Recall previous slides
  - Will be eliminated in compressed copies
- Cropping can save your life

OSINT

RZ Pan @ ZJU AAA

What is OSINT

- Open Source INTelligence

- Use publicly accessible data to analyze information
  - Fact check
  - Trace source
  - Save lives

Using OSINT

问下有没有认识2013年入学的[redacted]学长/学姐的同学，可能要自杀，想看看能不能拦一下

8163 收藏 显示所有图片

CC98十大热门

现在尝试了很多办法暂时联系不上她

你要不直接报警看看?

好的，我尝试一下

竺院院长已经在杭州报了警了

等等看看吧

Using OSINT

- GitHub id --> GitHub repo --> git log --> name pinyin --> ZJU English news --> ZJU Chinese news --> name --> company --> current name, phone, etc.

- Tools are neutral, human beings are not

How to play with search engines like a pro

- filetype:
  - pdf
  - xls/xlsx Excel
  - doc Word
  - ppt
- site:zju.edu.cn – leaked attachments / files
- inurl:url
- intitle:text
- intext:text

How to play with search engines like a pro

- 13801xxxxxx filetype:xls
  - 水电缴费列表.xls
  - xxx 报名情况统计表.xls
  - etc.
- 13801xxxxxx filetype:docx
  - xxx 学校结题报告.docx
- 张xx site:zju.edu.cn
  - 浙江省 xx 届 xx 竞赛获奖名单
  - 我校学子在第 xx 届“xx 杯”斩获佳绩

Learning OSINT

- Mainly focus on image analyze:

- Image reverse search
- Obtain location from image
- Obtain shot time from image
- Obtain other info from image

Image Reverse Search

- Who post this image online?
- Is this image cropped / edited when spreading?
- Should we consider an image to be reliable?

Image Reverse Search

- Baidu: for images that are obviously from Chinese platforms
- Google: for foreign images
- Bing: ditto
- Yandex:
  - Set “attention” area
  - Search for similar images
  - Useful for searching landscape
- TinEye: for finding *exactly* the same image

Image Reverse Search

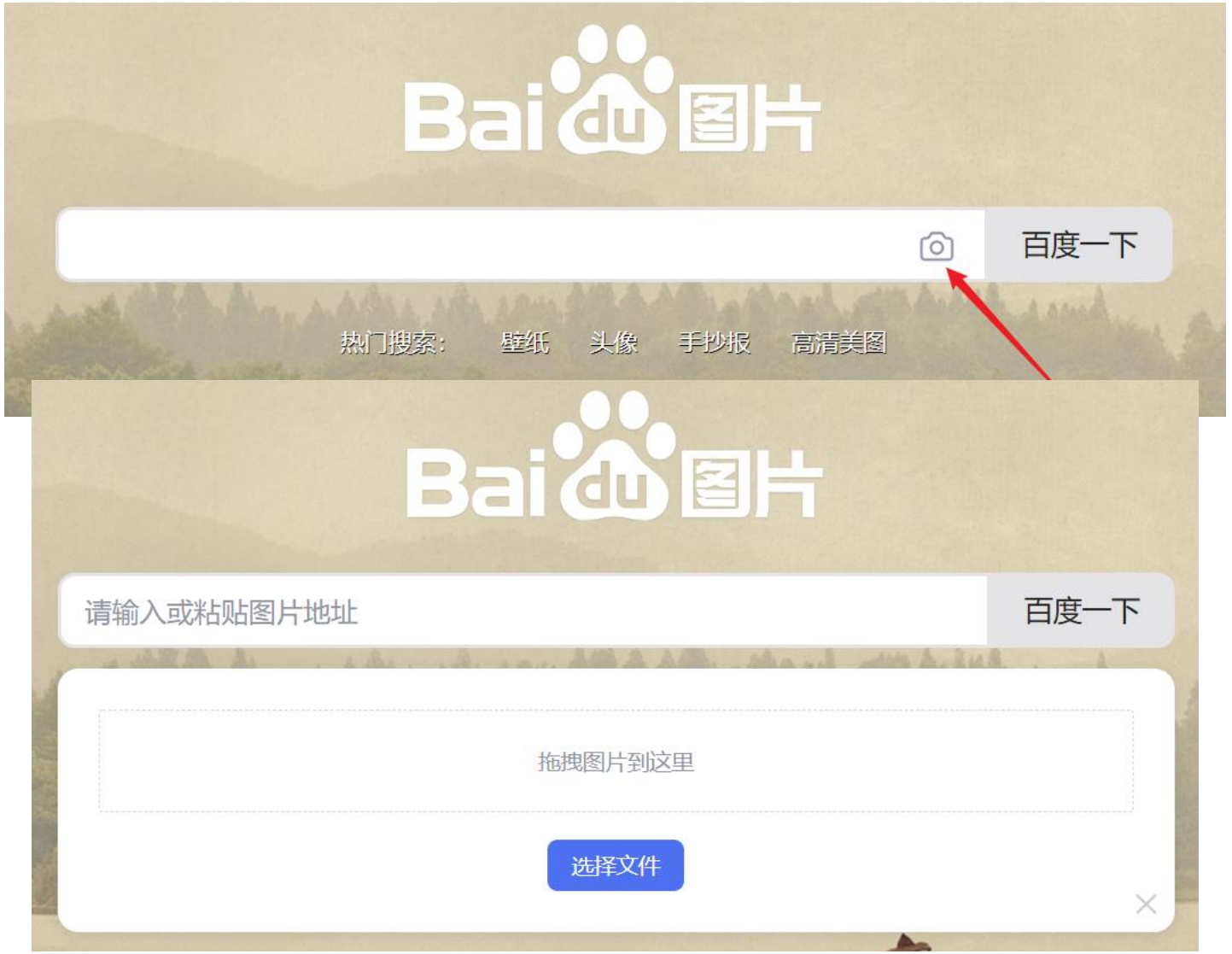


Image Reverse Search: An Example

Image Reverse Search: An Example

- A simple reverse search on Google and “filter by date range” reveals that the news is fake
- But we cannot claim that this lion is from Johannesburg that fast!
- What if the lion image appears even years before 2016?

https://metro.co.uk › News › Weird ▾ 翻译此页

Lion casually walks through city centre - Metro UK

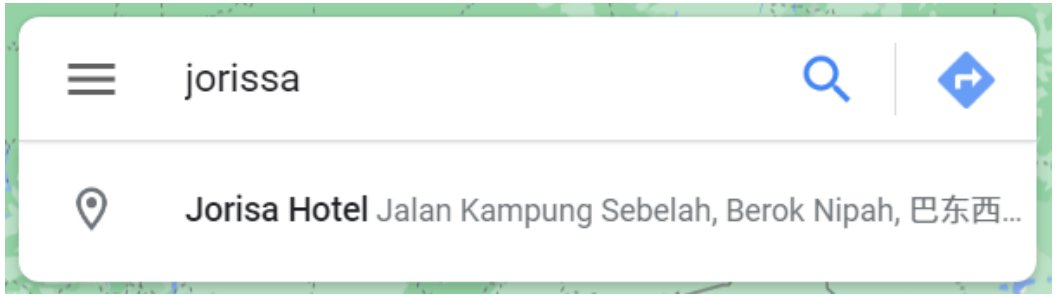
2500 × 1482 · 2016年4月15日 — A lion was seen casually walking through the city centre in Johannesburg, but was just 'acting' as part of a local production.

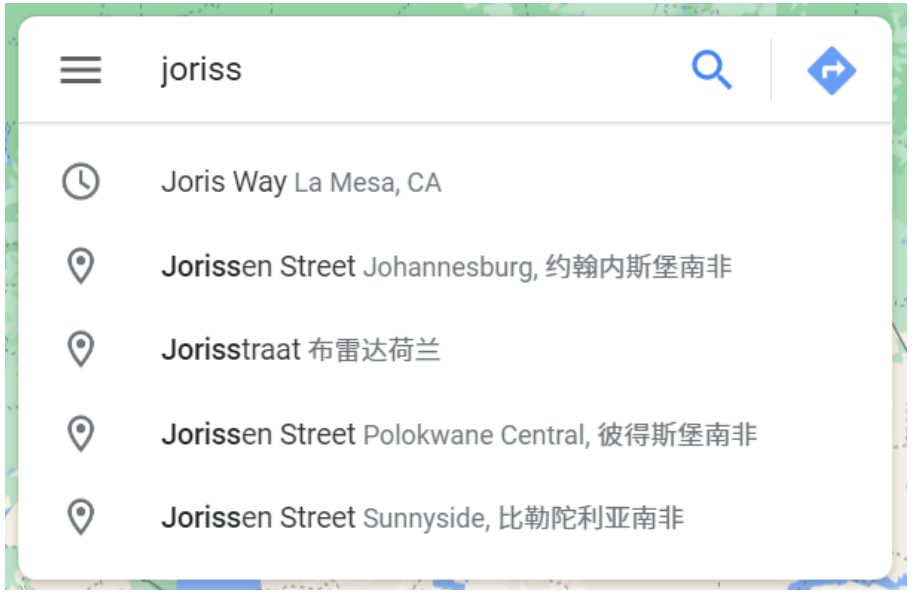
(Cont.)

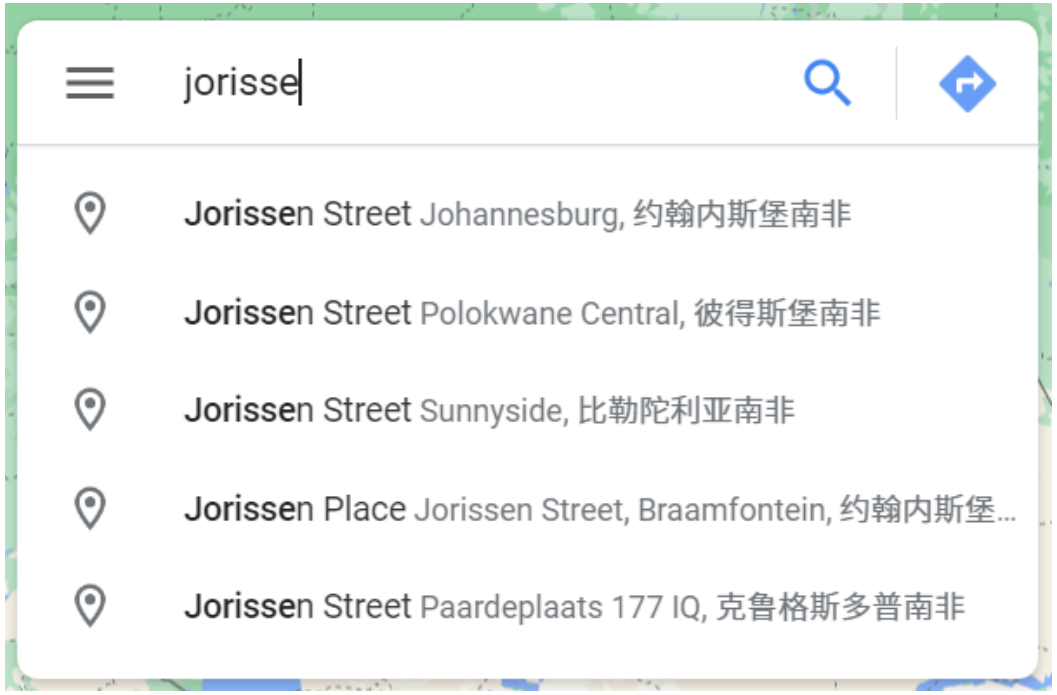
- Cropped out in previous images!
- Jorissa? Jorisse?
- Not O or S or R, J“O” has round corner, ditto for “S” and “R”
- Probably not B for F, because hard to pronounce “SSB” and “SSF”
- Guessing is important in OSINT!

(Cont.)

- Google Map







(Cont.)

- Use Google Earth to check, one-by-one


OFFICES & SHOPS
TO LET
011 378 3200
CELL C
Nando's
Nando's
© 2020 AfriGIS (Pty) Ltd.
© 2020 Google
US Dept of State Geographer
© 2020 Google
Google Earth
Imagery Date: 3/2017 26°11'34.16" S 28°02'09.72" E elev 1770 m eye alt 1.77 km

Image Reverse Search: An Example

- Some might claim a more simple approach:
- Reverse check, but “city center” is a big area
  - If you are lucky: find the correct road with a few attempts
  - Not lucky: wasting time
- Cannot avoid wasting time in OSINT completely, the key is to use experiences to waste as less time as possible
- Different strategies: when to take risks? Up to you

https://metro.co.uk › News › Weird ▾ 翻译此页

Lion casually walks through city centre - Metro UK

2500 × 1482 · 2016年4月15日 — A lion was seen casually walking through the city centre in Johannesburg, but was just 'acting' as part of a local production.

Image Reverse Search: An Example

- Date, location, & other info extracted from image successfully

- --> reverse search is the basic tool in OSINT for image
- Other tools available

Other tools

- Sun, shadow
- Culture specific signs
- Weather
- Other Geography knowledges
- And even Geometry (Yes!)

Sun & Shadow

- SunCalc.org
- SunEarthTools.com
- Make use of reference objects to extract length information!

- e.g.:
- Object : Shadow = 1 : 2.29
- Location is ZJU Zijingang Playground

Cont.

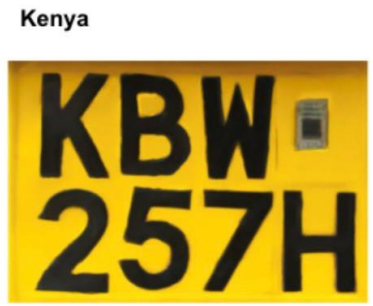
- e.g.:
- Object : Shadow = 1 : 2.29
- Location is ZJU Zijingang Playground
- Date is 2022/7/4

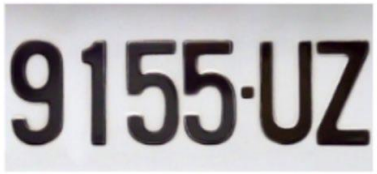
- Use arctan to get sun angle
- Use binary search to narrow time range
- Time will be determined to be around 17:05

Culture Specific Signs

- Buses, trains, road signs, …
- Game: GeoGuessr!

- Different regions have different:
  - Plates
  - Telegraph pole





Culture Specific Signs

- Buses, trains, road signs, …
- Game: GeoGuessr!

Yellow phone booth (Jersey)

Snow rocket (Japan)

Colombian Cross

- Different regions have different:
  - Plates
  - Telegraph pole
  - Road infra
  - Buses, trains, …

Weather

- Can be used for filtering out incorrect possibilities
- Different continents / regions have different weathers

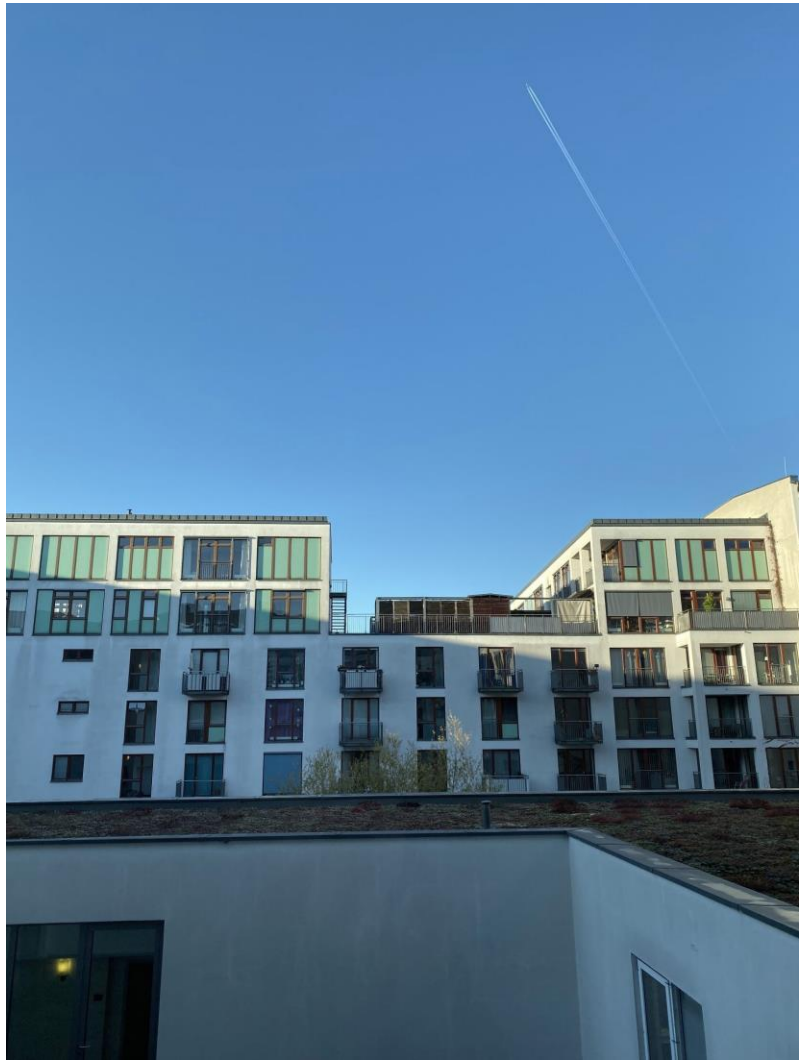
- Can also be used to determine the date if you already have a location

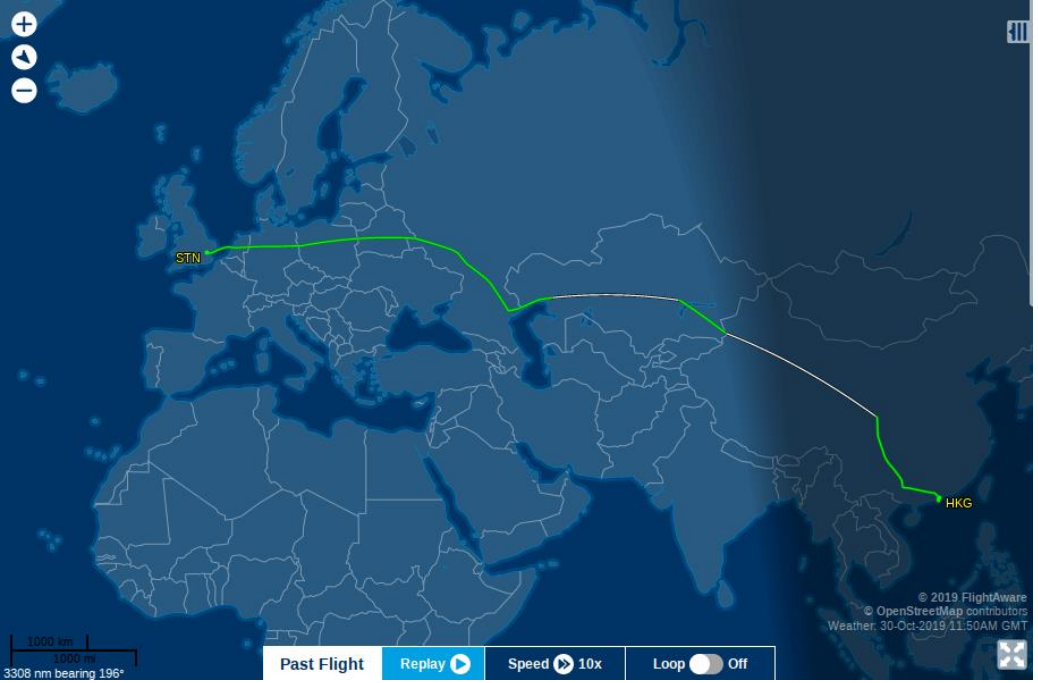
- Many websites store historic weather data

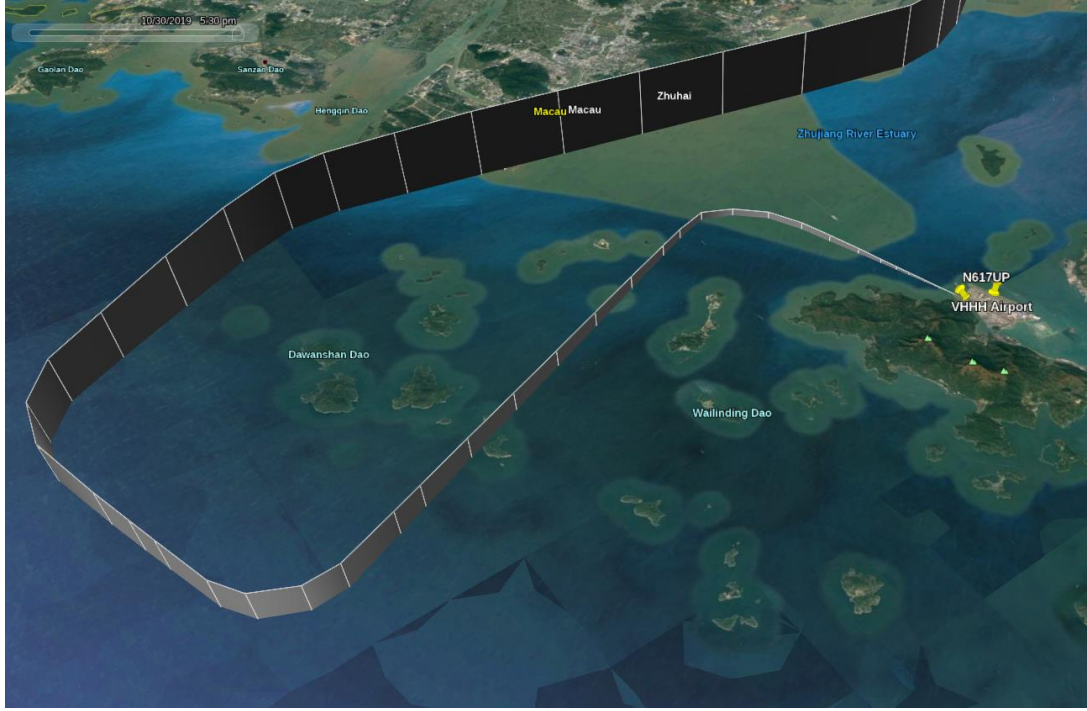
Other Geography Knowledges

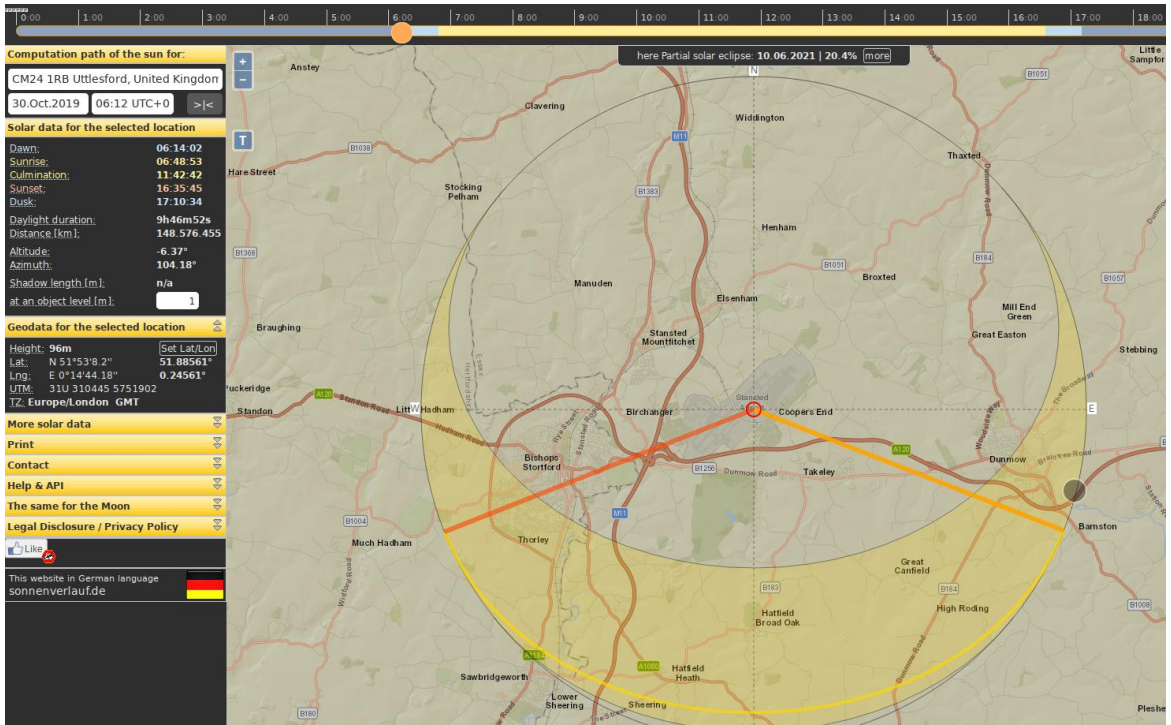
- Plane tail track direction

1. The plane in the sky is a Boeing 747 flying from London to Hong Kong
2. The photo was taken on October 30th 2019.
3. The photographer was in a hotel.



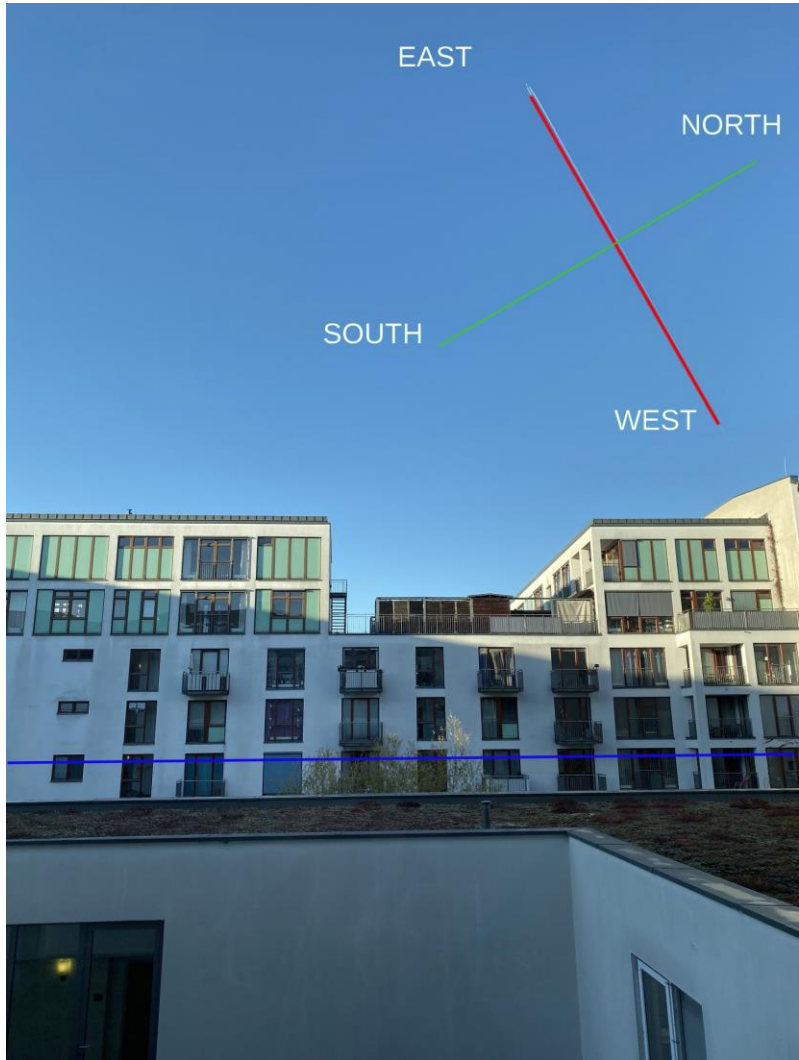

STN
HKG
© 2019 FlightAware
© OpenStreetMap contributors
Weather: 30-Oct-2019 11:50AM GMT
1000 km
1000 mi
3308 nm bearing 196°
Past Flight
Replay
Speed 10x
Loop Off


10/30/2019 5:30 pm
Gaolan Dao
Sanzao Dao
Hengqin Dao
Macau
Macau
Zhuhai
Zhujiang River Estuary
N617UP
VHHH Airport
Dawanshan Dao
Wailinding Dao


Computation path of the sun for:
CM24 1RB Uttlesford, United Kingdon
30.Oct.2019
06:12 UTC+0
Solar data for the selected location
Dawn: 06:14:02
Sunrise: 06:48:53
Culmination: 11:42:42
Sunset: 16:35:45
Dusk: 17:10:34
Daylight duration: 9h46m52s
Distance [km]: 148.576.455
Altitude: -6.37°
Azimuth: 104.18°
Shadow length [m]: n/a
at an object level [m]: 1
Geodata for the selected location
Height: 96m
Set Lat/Lon
Lat.: N 51°53'8.2" 51.88561°
Lng.: E 0°14'44.18" 0.24561°
UTM: 31U 310445 5751902
TZ: Europe/London GMT
More solar data
Print
Contact
Help & API
The same for the Moon
Legal Disclosure / Privacy Policy
This website in German language
sonnenverlauf.de
here Partial solar eclipse: 10.06.2021 | 20.4% more
Anstey
Clavering
Widdington
Thaxted
Hare Street
Stocking Pelham
Henham
Manuden
Elsenham
Broxted
Mill End Green
Great Easton
Braughing
Stansted Mountfitchet
Stebbing
Standon
Birchanger
Coopers End
Bishops Stortford
Takeley
Dunmow
Much Hadham
Thorley
Barnston
Great Canfield
Hatfield Broad Oak
High Roding
Sawbridgeworth
Hatfield Heath
Lower Sheering
Sheering

Other Geography Knowledges

- Directions determined by plane track data & time guess: time should be in the morning
- We can tell that the photographer is at the north side of the track
- Use your two hands to simulate



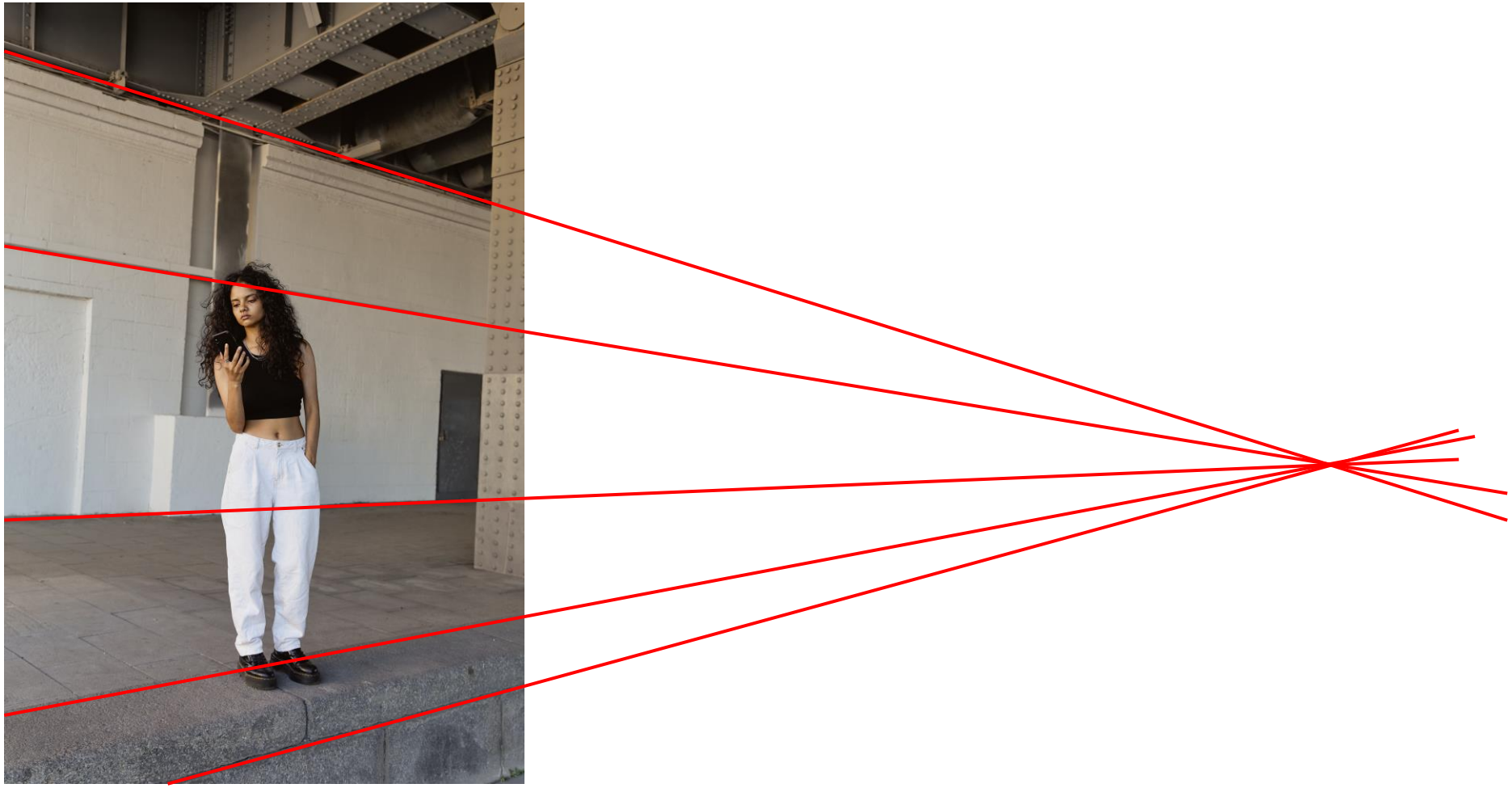
Geometry

- Parallel lines should cross at the horizon line

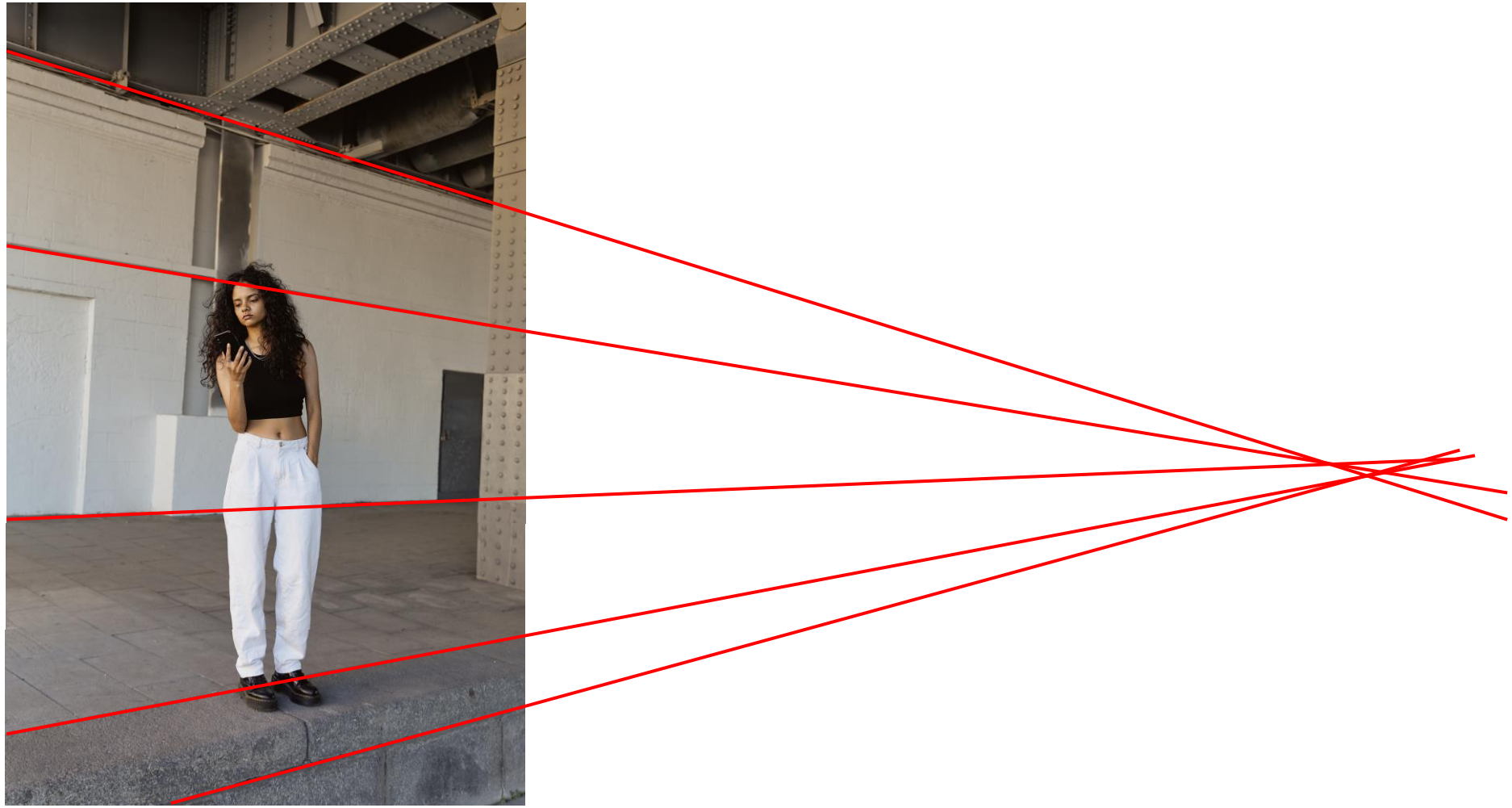
- Can be used to check whether the image has been edited or not
- Can be used to determine the photographer’s height

Geometry

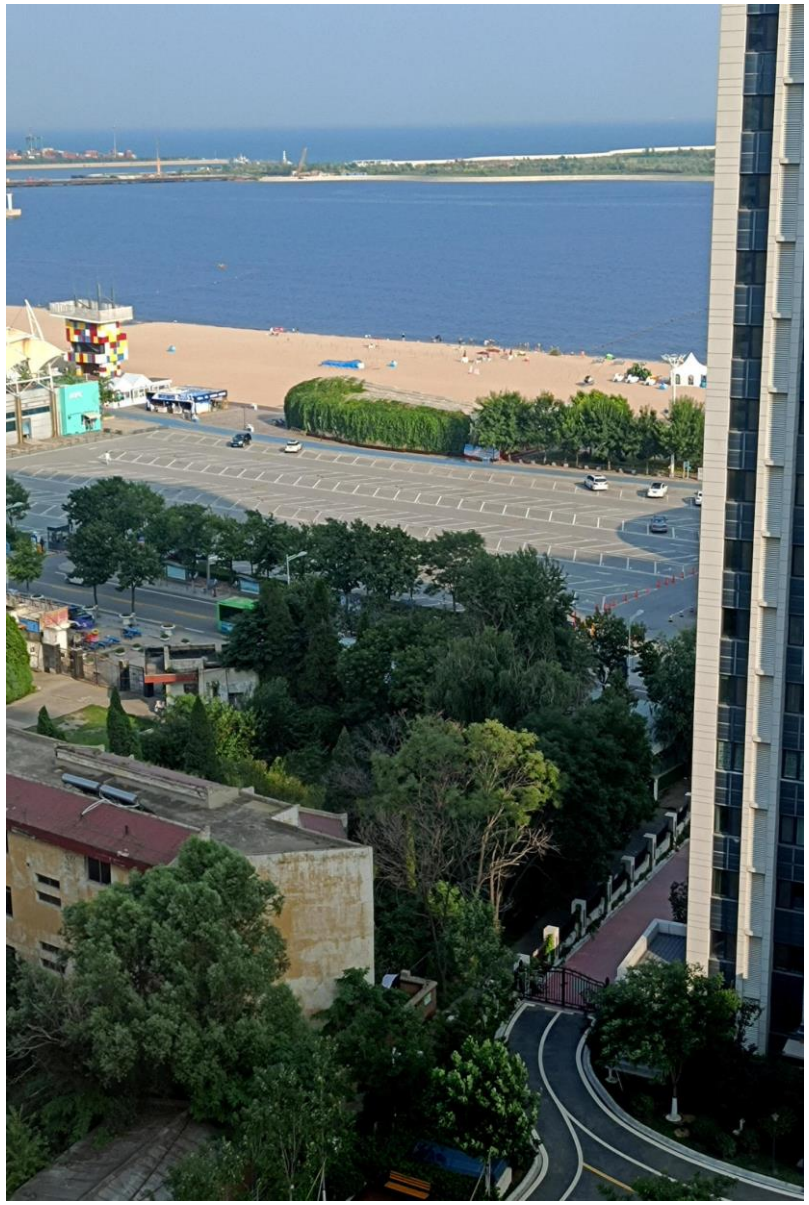
Geometry



Geometry

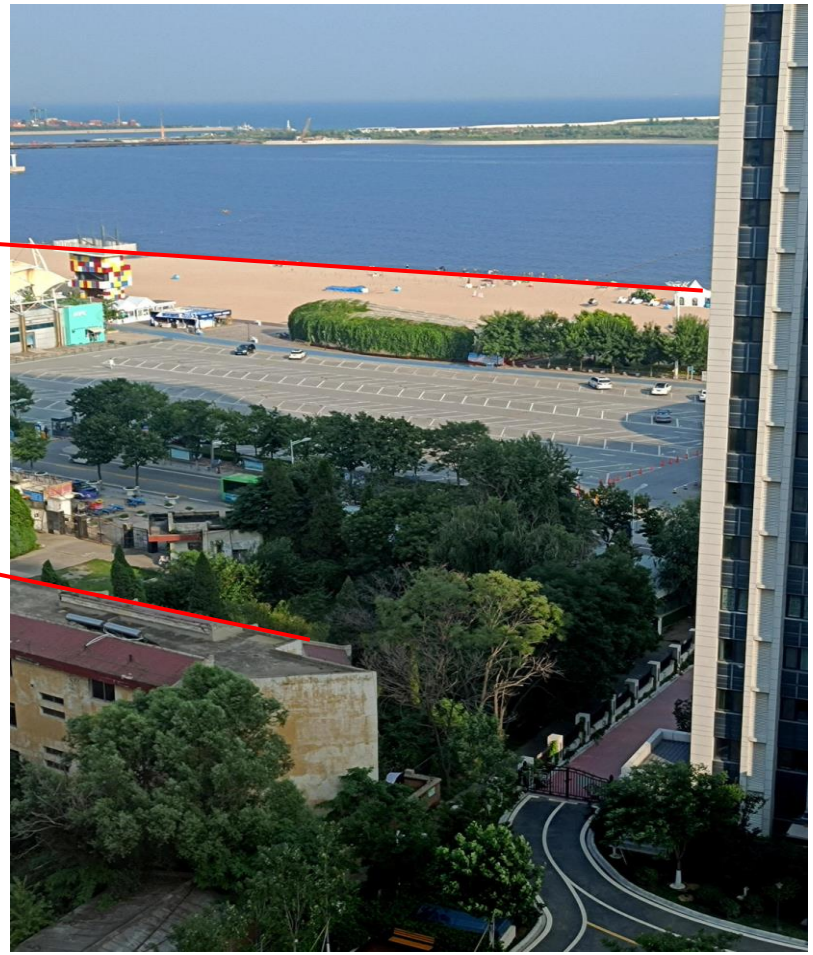


Geometry

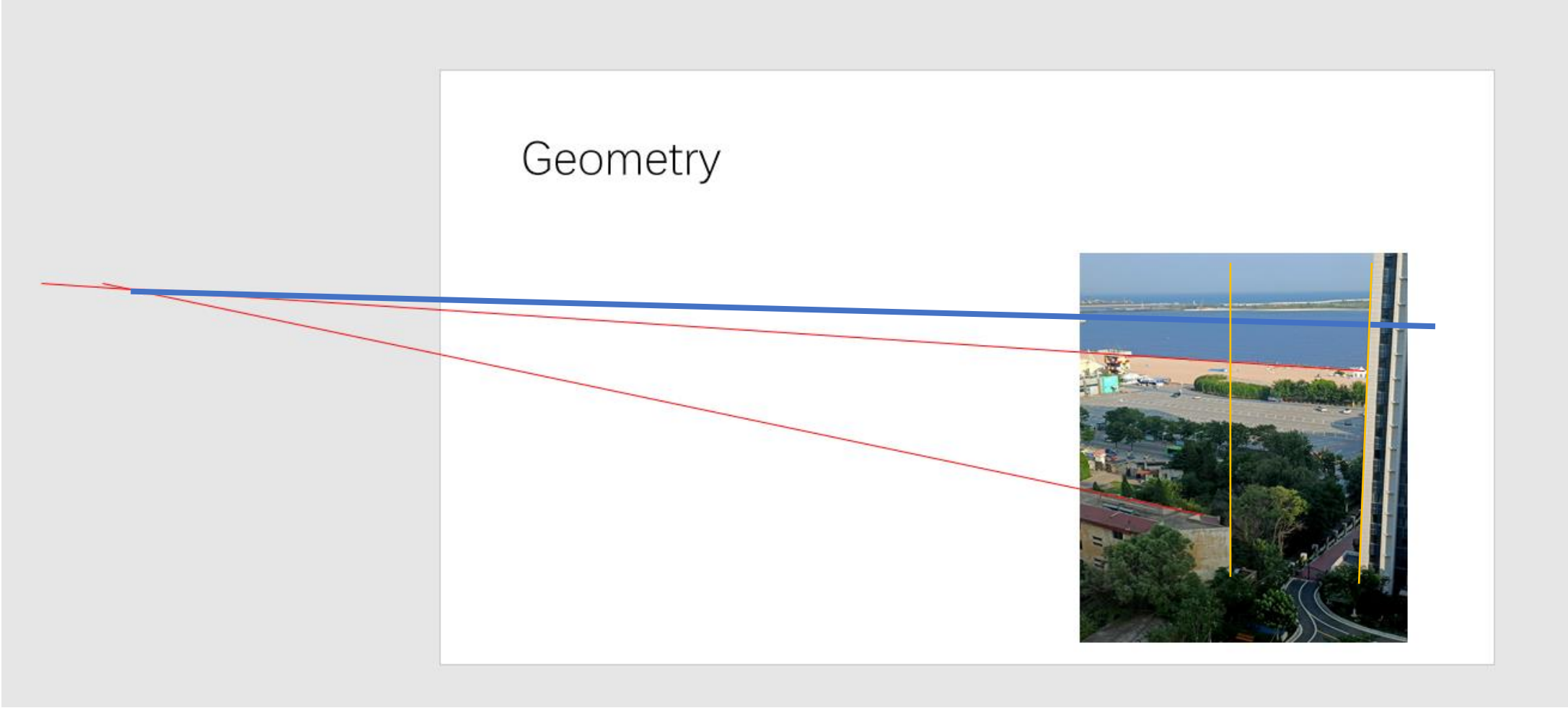


Geometry

Q: Are they really parallel lines?



Geometry



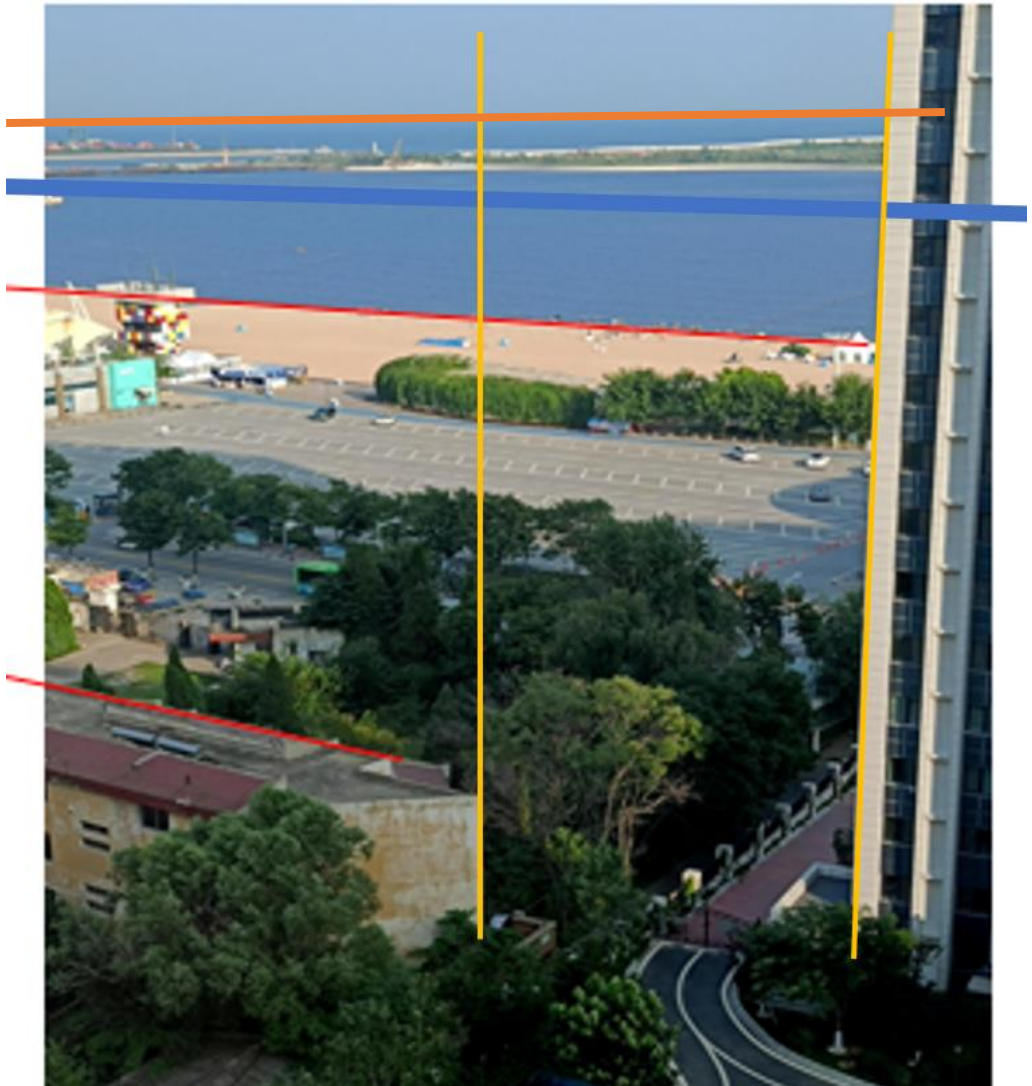
Geometry: Lens Distortion

Correct vertical lens distortion first!

Vertical parallel lines should be parallel in the photo

The horizon line should be perpendicular to all vertical parallel lines: building walls, towers, lamps, ice drops, etc.

Aim: get rid of errors caused by photo rotation

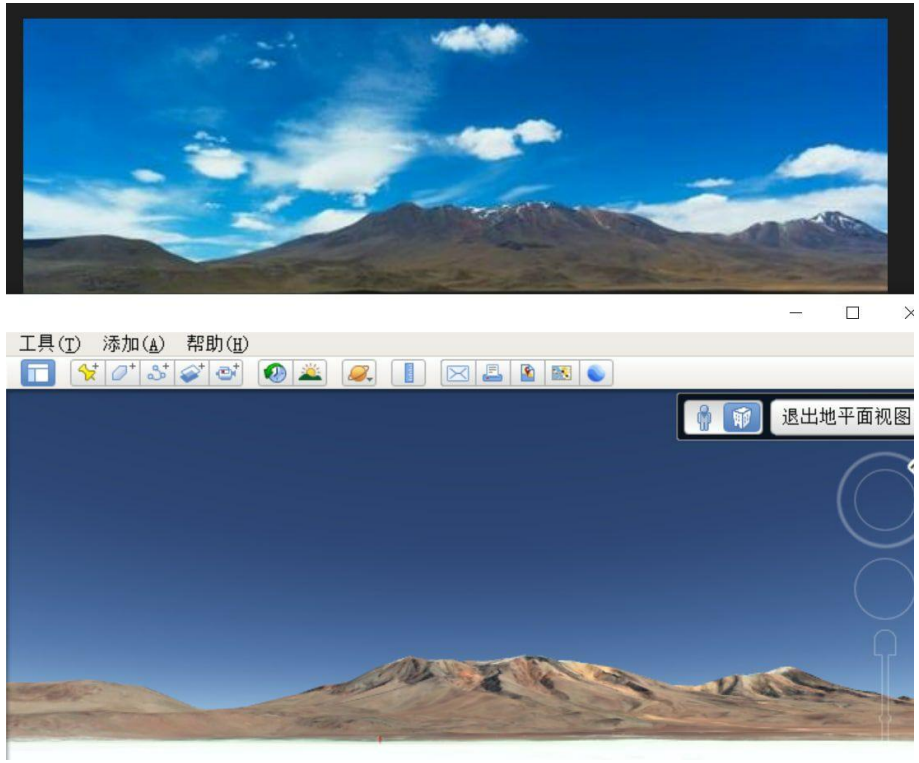


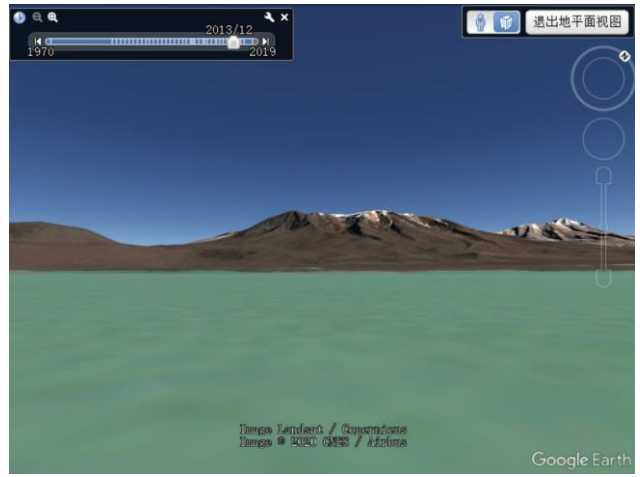
Landscape

- Use Yandex
- Laguna Hedionda, Bolivia

commons.wikimedia.org

This page was last edited on 7 January 2021, at 18:00.





- Thanks