



**Actuaries
Institute**

Starting the Data Analytics Journey

Data collection

Zeming Yu and Leon Yan

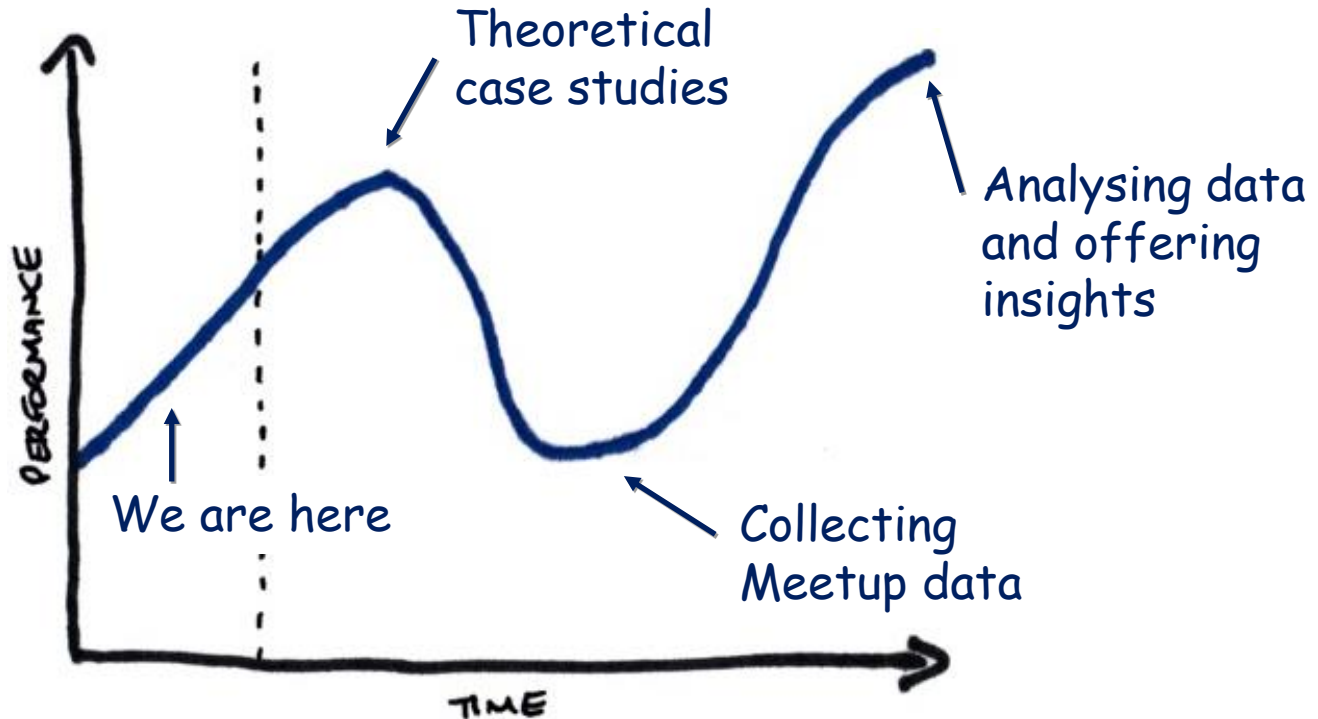
Today's agenda

- Highs and lows (10 minutes – Leon)
 - Over the next 90 minutes...
 - It's okay to feel...
- Theoretical case studies (20 minutes – Leon)
 - When's the best time to fly?
 - How accurate are the punters?
- Real case study (60 minutes – Zem)
 - Collecting Meetup data
 - Analysing Meetup data and offering insights

Act 1

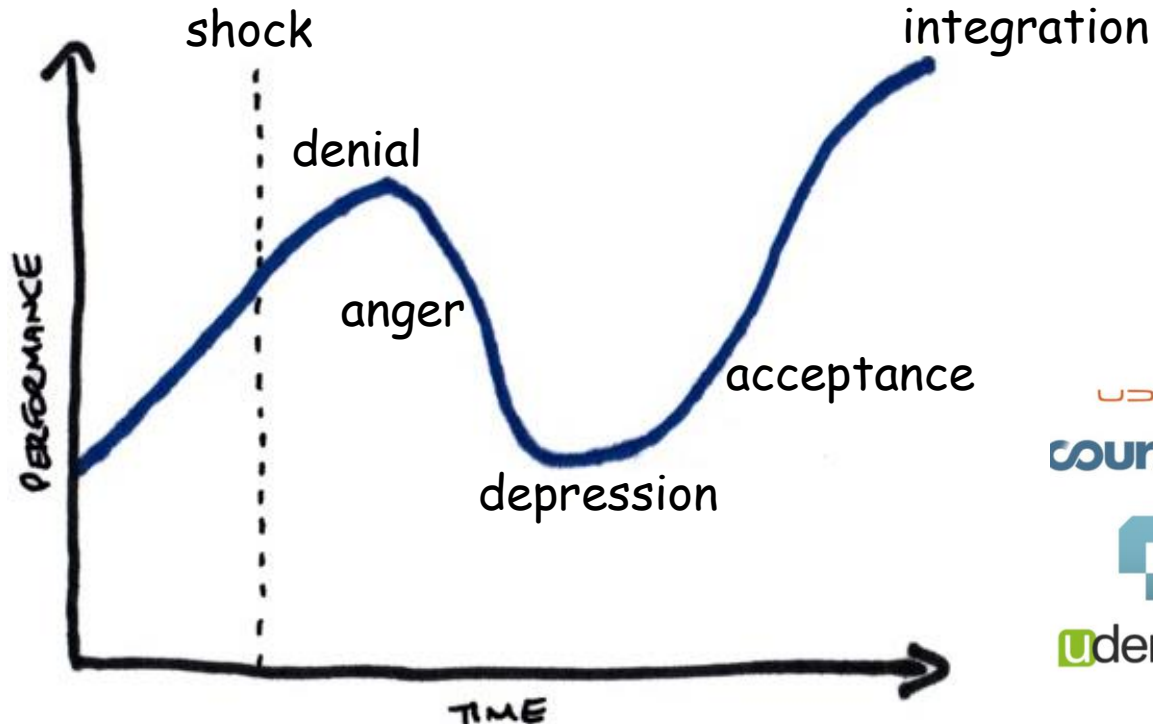
HIGHS AND LOWS

Over the next 90 minutes



*“The only impossible journey
is the one you never begin”*

It's okay to feel...



Tips

- Get your hands dirty
- Be prepared to work with IT and to debug PC issues
- Choose a pet project
- Build momentum
- Avoid excess multi-tasking
- Tutorials
- Try different packages
- Google for answers
- Collaborate with colleagues
- Write notes and comment code
- Do take breaks

Act 2

THEORETICAL CASE STUDIES

When's the best time to fly?

Number of
daily flights



Route



Day of the
week



Time of
the day



Week in
the year



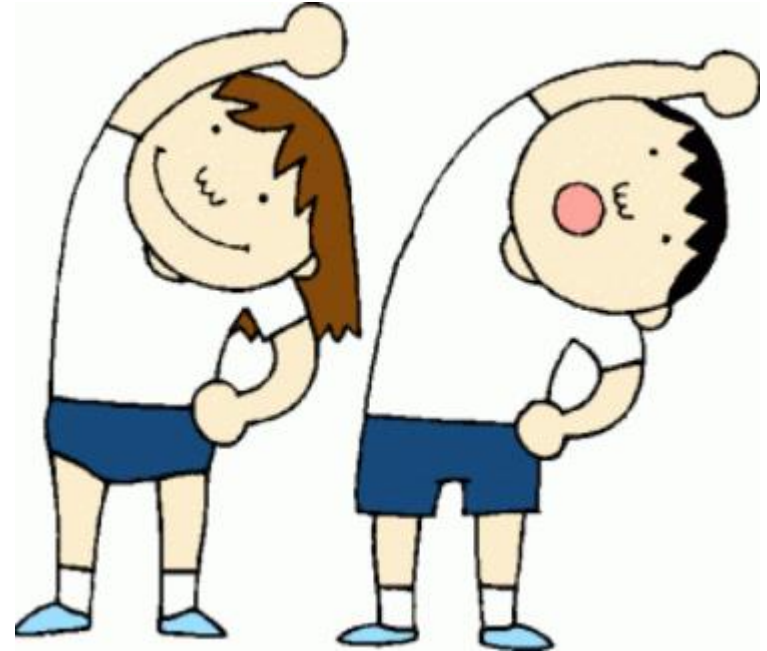
17% of industry flights were adversely
delayed by 15 minutes or longer

How accurate are the punters?

Outcome	Odds	Implied Probability	Comparison	Perceived Probability
Arsenal wins	1.80	56%	>	45%
Draw	3.00	33%	<	35%
Arsenal loses	5.50	18%	<	20%
		107%		100%

(...time to get up and stretch)

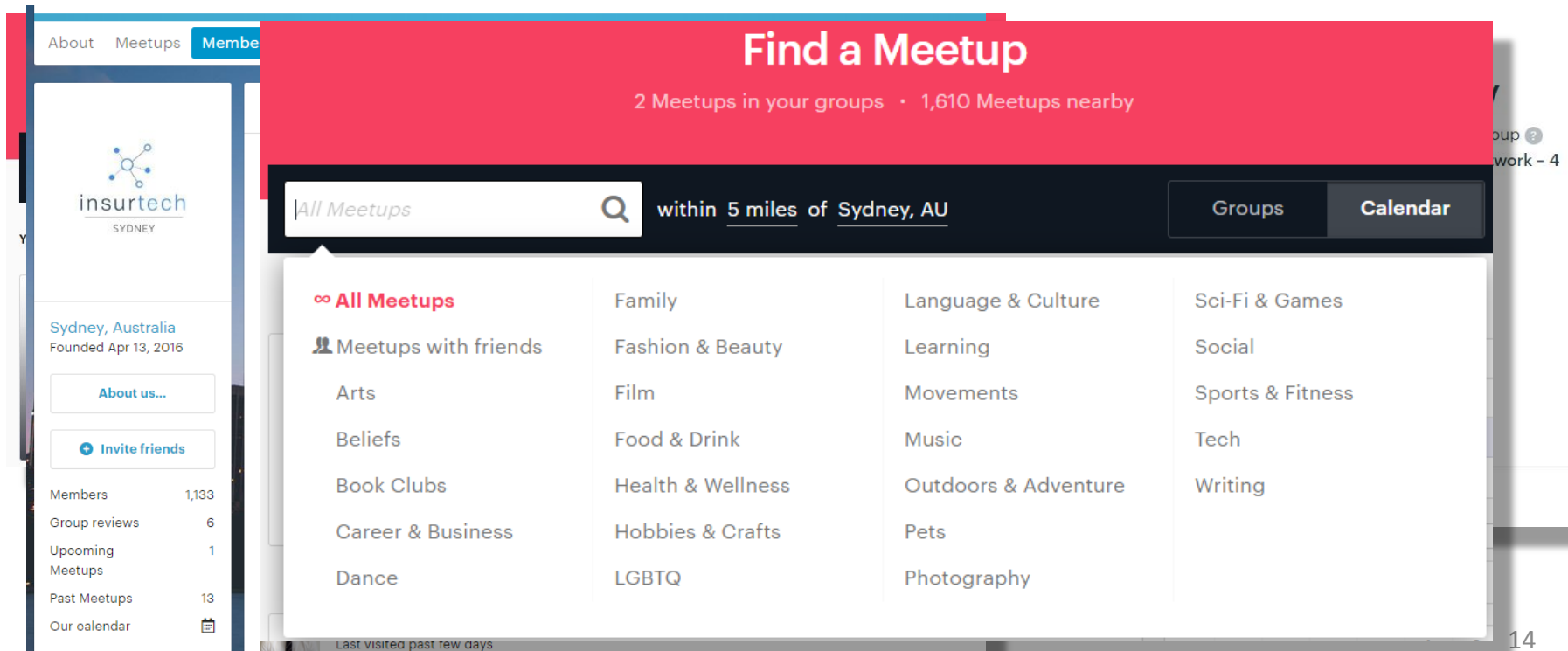
INTERMISSION



Act 3

REAL CASE STUDY

Case Study



The screenshot shows the Meetup website interface. At the top, there's a navigation bar with 'About', 'Meetups', and 'Members' tabs. Below this is a red banner with the text 'Find a Meetup' and '2 Meetups in your groups • 1,610 Meetups nearby'. A search bar contains the text 'All Meetups' and a magnifying glass icon. To the right of the search bar, it says 'within 5 miles of Sydney, AU'. Below the search bar, there are two buttons: 'Groups' and 'Calendar'. The main content area displays a grid of categories for meetups, including 'All Meetups', 'Meetups with friends', 'Family', 'Fashion & Beauty', 'Language & Culture', 'Sci-Fi & Games', 'Arts', 'Beliefs', 'Book Clubs', 'Career & Business', 'Dance', 'Food & Drink', 'Health & Wellness', 'Hobbies & Crafts', 'LGBTQ', 'Learning', 'Movements', 'Music', 'Outdoors & Adventure', 'Pets', 'Photography', 'Social', 'Sports & Fitness', 'Tech', and 'Writing'. On the left side, there's a sidebar for 'insurtech SYDNEY' with a logo, a description 'Sydney, Australia Founded Apr 13, 2016', and buttons for 'About us...' and 'Invite friends'. Below this, there's a section for 'Members' with a list of statistics: 'Members 1,133', 'Group reviews 6', 'Upcoming Meetups 1', 'Past Meetups 13', and 'Our calendar' with a calendar icon. At the bottom, there's a footer with the text 'Last visited past few days'.

Application Programming Interface



TripView Lite

TripView Pty Ltd Travel & Local

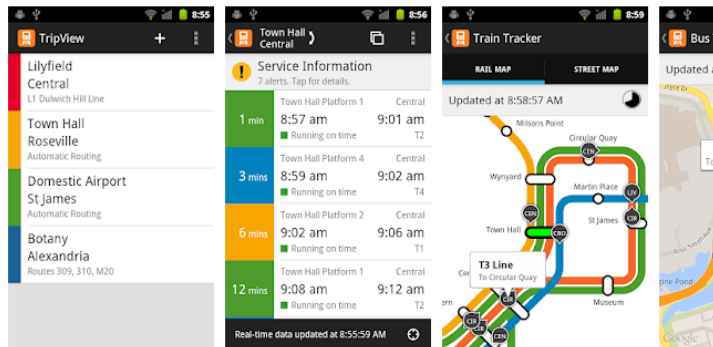
★★★★★ 5,723



Contains Ads

Add to Wishlist

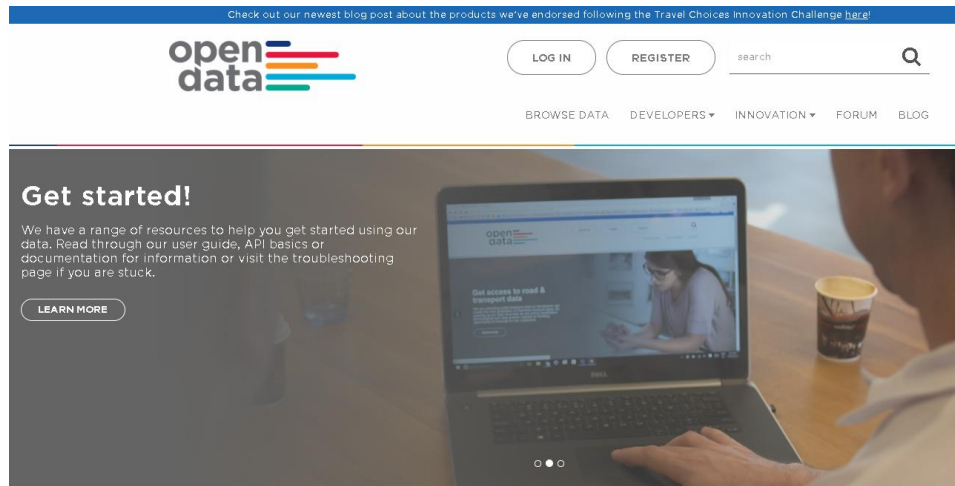
Install



TripView displays Sydney and Melbourne public transport timetable data on your phone. It features a summary view showing your next services, as well as a full timetable viewer. All timetable data is stored on your phone, so it can be used offline.

Features:

- Trackwork and service interruption information



Data Catalogue

Browse our extensive data catalogue and access resources

MORE



General Info

Learn more about the open data hub and developer portal

MORE



Developers

Find everything you need to get started and access our data

MORE



Showcase

Check out how other developers have used our data

MORE

Application Programming Interface

 Gmail > API

Modern, easy, fast, RESTful.

[HOME](#)

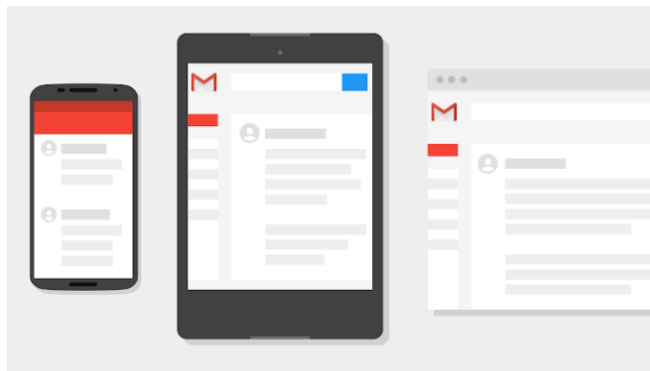
[GUIDES](#)

[REFERENCE](#)

[SAMPLES](#)

[SUPPORT](#)

Flexible, RESTful access to the user's inbox




Gmail API overview

Read and send messages, work with labels, and search for specific threads.

[OVERVIEW](#)

Application Programming Interface



[Home](#)
[Installation](#)
[Documentation](#)
[Examples](#)

[Fork me on GitHub](#)

[Previous](#)
Understanding...

[Next](#)
sklearn.base...

[scikit-learn v0.19.1](#)
[Other versions](#)

Please [cite us](#) if you use the software.

API Reference

This is the class and function reference of scikit-learn. Please refer to the [full user guide](#) for further details, as the class and function raw specifications may not be enough to give full guidelines on their uses.

sklearn.base : Base classes and utility functions

Base classes for all estimators.

Base classes

<code>base.BaseEstimator</code>	Base class for all estimators in scikit-learn
<code>base.Biclustermixin</code>	Mixin class for all bicluster estimators in scikit-learn
<code>base.ClassifierMixin</code>	Mixin class for all classifiers in scikit-learn.
<code>base.ClusterMixin</code>	Mixin class for all cluster estimators in scikit-learn.
<code>base.DensityMixin</code>	Mixin class for all density estimators in scikit-learn.
<code>base.RegressorMixin</code>	Mixin class for all regression estimators in scikit-learn.
<code>base.TransformerMixin</code>	Mixin class for all transformers in scikit-learn.

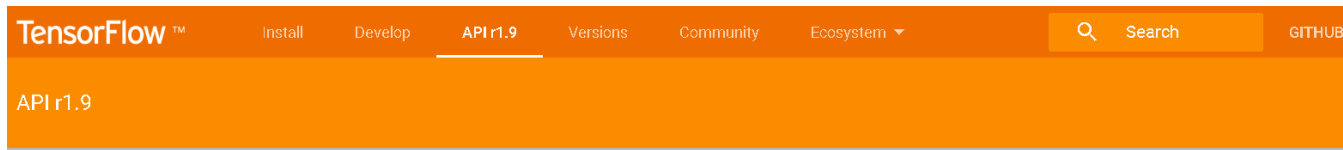
Functions

<code>base.clone (estimator[, safe])</code>	Constructs a new estimator with the same parameters.
<code>config_context (**new_config)</code>	Context manager for global scikit-learn configuration
<code>get_config ()</code>	Retrieve current values for configuration set by set_config
<code>set_config (assume_finite)</code>	Set global scikit-learn configuration

[Previous](#)

[Next](#)

Application Programming Interface



Overview r1.9
Python API r1.9
C++ API r1.9
Java API r1.9
Go API
JavaScript API
Swift (Early Release)
TensorFlow Serving C++
TensorFlow Versions

API Documentation



TensorFlow has APIs available in several languages both for constructing and executing a TensorFlow graph. The Python API is at present the most complete and the easiest to use, but other language APIs may be easier to integrate into projects and may offer some performance advantages in graph execution.

A word of caution: the APIs in languages other than Python are not yet covered by the [API stability promises](#).

- [Python](#)
- [C++](#)
- [Java](#)
- [Go](#)
- [Swift \(Early Release\)](#)

We also provide the C++ API reference for TensorFlow Serving:

- [TensorFlow Serving](#)

We encourage the community to develop and maintain support for other languages with the [approach recommended by the TensorFlow maintainers](#). For example, see the bindings for: [C#](#), [Haskell](#), [Julia](#), [Ruby](#), [Rust](#), and [Scala](#).

Application Programming Interface

meetup

[Start a new group](#) | [Explore](#)

Meetup API **Documentation** Console API Key OAuth Consumers Widget Foundry Applications Client Libraries

Extend your community



Meet the API

The Meetup API provides simple RESTful HTTP and streaming interfaces for exploring and interacting Meetup platform from your own apps.

Composing a request

The API is a set of core methods and a common request format. These are combined to form a URI that returns the information you want. Here's an example of an API call that

API methods

Type Method

v3 abuse

POST `/:username/abuse_reports`
 POST `/self/abuse_reports`
 GET `/self/blocks/:member_id`
 POST `/self/blocks/:member_id`
 DELETE `/self/blocks/:member_id`

v3 batch

POST `/batch`

v3 boards

GET `/:username/boards`
 GET `/:username/boards/:bid/...`
 GET `/:username/boards/:bid/...`

v2 categories

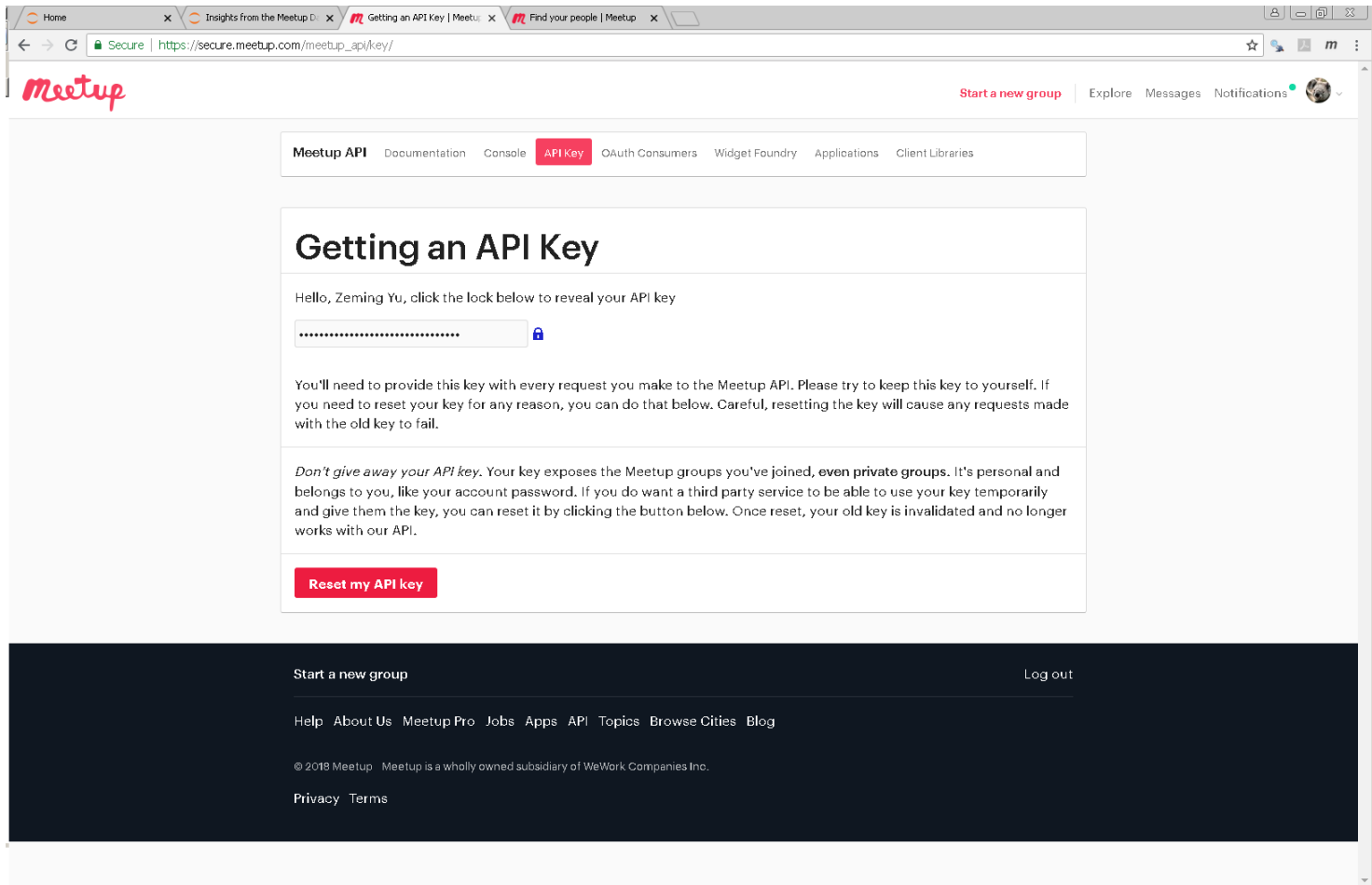
GET `/2/categories`

v2 cities

GET `/2/cities`

v3 comments

GET `/:username/events/:event...`



The screenshot shows a web browser with multiple tabs open. The active tab is titled 'Getting an API Key | Meetup' and the address bar shows the URL 'https://secure.meetup.com/meetup_api/key/'. The Meetup logo is in the top left, and navigation links like 'Start a new group', 'Explore', 'Messages', and 'Notifications' are in the top right. A navigation bar below the header contains links: 'Meetup API', 'Documentation', 'Console', 'API Key' (highlighted in red), 'OAuth Consumers', 'Widget Foundry', 'Applications', and 'Client Libraries'. The main content area is titled 'Getting an API Key' and contains the following text:

Hello, Zeming Yu, click the lock below to reveal your API key

..... 🔒

You'll need to provide this key with every request you make to the Meetup API. Please try to keep this key to yourself. If you need to reset your key for any reason, you can do that below. Careful, resetting the key will cause any requests made with the old key to fail.

Don't give away your API key. Your key exposes the Meetup groups you've joined, **even private groups**. It's personal and belongs to you, like your account password. If you do want a third party service to be able to use your key temporarily and give them the key, you can reset it by clicking the button below. Once reset, your old key is invalidated and no longer works with our API.

[Reset my API key](#)

The footer is dark blue and contains the following links and text:

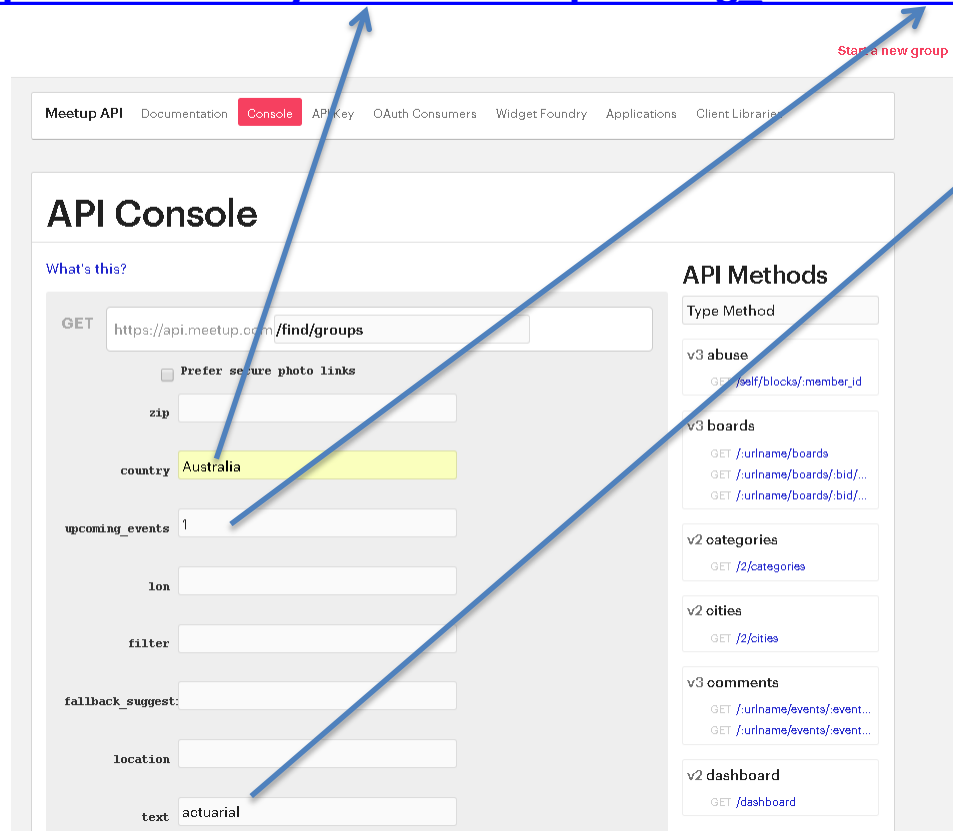
[Start a new group](#) [Log out](#)

[Help](#) [About Us](#) [Meetup Pro](#) [Jobs](#) [Apps](#) [API](#) [Topics](#) [Browse Cities](#) [Blog](#)

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[Privacy](#) [Terms](#)

https://api.meetup.com/find/groups?&sign=true&photo-host=public&country=Australia&upcoming_events=1&text=actuarial&page=100



The screenshot shows the Meetup API Console interface. At the top, there's a navigation bar with links: Meetup API, Documentation, Console (highlighted in red), API Key, OAuth Consumers, Widget Foundry, Applications, and Client Libraries. Below this is the "API Console" section. On the left, there's a "What's this?" link. The main area is divided into two columns. The left column contains a form for configuring an API request. The right column, titled "API Methods", lists various API endpoints categorized by version (v3, v2, v3, v2, v3, v2) and type (GET, POST, etc.).

API Console

What's this?

GET

☐ Prefer secure photo links

zip

country

upcoming_events

lon

filter

fallback_suggest:

location

text

API Methods

Type Method

v3 abuse

GET /self/blocks/:member_id

v3 boards

GET /:username/boards

GET /:username/boards/:bidf...

GET /:username/boards/:bidf...

v2 categories

GET /2/categories

v2 cities

GET /2/cities

v3 comments

GET /:username/events/:event...

GET /:username/events/:event...

v2 dashboard

GET /dashboard

HTTP/1.1 200 success

```
{
  "0": {
    "score": 4635,
    "id": 25686650,
    "name": "Social Networking Actuaries Group",
    "status": "active",
    "link": "https://www.meetup.com/Actuaries-Social-Networking-Group/",
    "urlname": "Actuaries-Social-Networking-Group",
    "description": "<p>It's been said that more than 80% of jobs are landed through networking rather than traditional job application methods. Expensive MBA programs are sought after for the value of its alumni network more so than the content of the program. As well as improving job prospects or accessing business opportunities, networking can provide the opportunity to: <br>• create new relationships and build on existing relationships; <br>• share knowledge and ideas; <br>• gain and provide advice and support.</p><p>The New Social Networking Committee Goals <br>The newly formed Social Networking Group's (SNG) aims to provide Actuaries Institute members with opportunities to network and connect with each other as well as those in non-actuarial but related communities. We plan to hold events that <br>• focus on building skills <br>• as well as social events that allows members to expand their network. <br>All our events will be relaxed and accessible and there will be plenty of opportunities for members to participate.</p>",
    "created": 1503967251000,
    "city": "Sydney",
    "untranslated_city": "Sydney",
    "country": "AU",
    "localized_country_name": "Australia",
    "localized_location": "Sydney, Australia",
    "state": "",
    "join_mode": "open",
    "visibility": "public",
    "lat": -33.87,
    "lon": 151.21,
    "members": 250,
    "organizer": {
      "id": 235119079,
      "name": "Social Networking Actuaries Grou",
      "bio": "",
      "photo": {
        "id": 270142196,
        "highres_link": "https://secure.meetupstatic.com/photos/member/5/6/b/4/highres_27014
```

[About](#)
[Meetups](#)
[Members](#)
[Photos](#)
[Discussions](#)
[More](#)
[Join this group](#)

What we're about

It's been said that more than 80% of jobs are landed through networking rather than traditional job application methods. Expensive MBA programs are sought after for the value of its alumni network more so than the content of the program. As well as improving job prospects or accessing business opportunities, networking can provide the opportunity to:

- create new relationships and build on existing relationships;
- share knowledge and ideas;
- gain and provide advice and support.

The New Social Networking Committee Goals

The newly formed Social Networking Group's (SNG) aims to provide Actuaries Institute members with opportunities to network and connect with each other as well as those in non-actuarial but related communities. We plan to hold events that

- focus on building skills
- as well as social events that allows members to expand their network.

All our events will be relaxed and accessible and there will be plenty of opportunities for members to participate.

Members (250)

Organized by Social Networking Actuaries Grou and 14 others

[Message](#)

Upcoming Meetups

[See all](#)

13 JUL

Fri, Jul 13, 2018, 5:30 PM

Post ST9 & ST1 exam Results Drinks - SYDNEY

Hosted by Bill Konstantinidis and 4 others

6 going

Attend

28 SEP

Fri, Sep 28, 2018, 5:30 PM

Post CAP course result drinks - SYDNEY

Hosted by Kim

4 going

Attend

Past Meetups (12)

[See all](#)

21 JUN

Thu, Jun 21, 2018, 5:30 PM

Post Part III exam results drinks - SYDNEY

```

"who": "Members",
"key_photo": {
  "id": 466049623,
  "highres_link":
    "https://secure.meetupstatic.com/photos/event/7/3/b/7/highres_4",
  "photo_link":
    "https://secure.meetupstatic.com/photos/event/7/3/b/7/600_46604",
  "thumb_link":
    "https://secure.meetupstatic.com/photos/event/7/3/b/7/thumb_466",
  "type": "event",
  "base_url": "https://secure.meetupstatic.com"
},
"timezone": "Australia/Sydney",
"next_event": {
  "id": "251221735",
  "name": "Pre EOFY Drinks - MELBOURNE",
  "yes_rsvp_count": 14,
  "time": 1530084600000,
  "utc_offset": 36000000
},
"category": {
  "id": 2,
  "name": "Career & Business",
  "shortname": "Career-business",
  "sort_name": "Career & Business"
},
"meta_category": {
  "id": 522,
  "shortname": "career-business",
  "name": "Career & Business",
  "sort_name": "Career & Business",
  "photo": {
    "id": 450131927,
    "highres_link":
      "https://secure.meetupstatic.com/photos/event/2/e/9/7/highres",
    "photo_link":
      "https://secure.meetupstatic.com/photos/event/2/e/9/7/600_450",
    "thumb_link":
      "https://secure.meetupstatic.com/photos/event/2/e/9/7/thumb_4",
    "type": "event",
    "base_url": "https://secure.meetupstatic.com"
  }
},
"category_ids": [
  2
]
}

```

[About](#) [Meetups](#) [Members](#) [Photos](#) [Discussions](#) [More](#)

[Join this group](#)

...

Next Meetup

[See all](#)

27
JUN

Wednesday, June 27, 2018, 5:30 PM

Pre EOFY Drinks - MELBOURNE



Hosted by [Melissa Tam](#) and [Ian Le](#)

Join us for drinks at Whitehart Bar and enjoy the calm before the EOFY storm.

 14 going



Attend



Whitehart Bar
22 Whitehart Lane - Melbourne

What we're about

It's been said that more than 80% of jobs are landed through networking rather than traditional job application methods. Expensive MBA programs are sought after for the value of its alumni network more so than the content of the program. As well as improving job prospects or accessing business opportunities, networking can provide the opportunity to:

- create new relationships and build on existing relationships;
- share knowledge and ideas;
- gain and provide advice and support.

The New Social Networking Committee Goals

The newly formed Social Networking Group's (SNG) aims to provide Actuaries Institute members with opportunities to network and connect with each other as well as those in more external but related communities. We also intend to hold

Upcoming Meetups

[See all](#)

13
JUL

Fri, Jul 13, 2018, 5:30 PM
**Post ST9 & ST1 exam Results
Drinks - SYDNEY**



Hosted by [Bill Konstantinidis](#) and [4 others](#)

 6 going

Attend

JavaScript Object Notation

- Plain text format
- De facto data format for web and mobile apps
- Very flexible - great for unstructured data
- Supported by most programming languages


```
1 {
2   "0": {
3     "name": "Social Networking Actuaries Group",
4     "urlname": "Actuaries-Social-Networking-Group",
5     "members": 250,
6     "next_event": {
7       "id": "251221735",
8       "name": "Pre EOFY Drinks - MELBOURNE",
9     },
10    "1": {
11      "name": "Eastern Suburbs Property Investment Network",
12      "urlname": "Eastern-Suburbs-Property-Investment-Strategy",
13      ...
14      "members": 569,
15      "next_event": {
16        "id": "251744354",
17        "name": "FREE 1 Hour Property Coaching Session",
18      },
19    },
20    "2": {
21      "name": "North Sydney Property Investment Network",
22      ...
23    }
24 }
```

```
{
  "0": {
    "name": "Social Networking Actuaries Group",
    "urName": "Actuaries-Social-Networking-Group",
    "members": 250,
    "next_event": {
      "id": "251221735",
      "name": "Pre EOFY Drinks - MELBOURNE",
    },
  },
  "1": {
    "name": "Eastern Suburbs Property Investment Network",
    "urName": "Eastern-Suburbs-Property-Investment-Strategy",
    ...
    "members": 569,
    "next_event": {
      "id": "251744354",
      "name": "FREE 1 Hour Property Coaching Session",
    },
  },
  "2": {
    "name": "North Sydney Property Investment Network",
    ...
  }
}
```

3 "name": "Social Networking Actuaries Group",

- Key: "name"
- Value: "Social Networking Actuaries Group"

```
{
  "0": {
    "name": "Social Networking Actuaries Group",
    "urlname": "Actuaries-Social-Networking-Group",
    "members": 256,
    "next_event": {
      "id": "251221735",
      "name": "Pre EOFY Drinks - MELBOURNE",
    },
  },
  "1": {
    "name": "Eastern Suburbs Property Investment Network",
    "urlname": "Eastern-Suburbs-Property-Investment-Strategy",
    ...
    "members": 569,
    "next_event": {
      "id": "251744354",
      "name": "FREE 1 Hour Property Coaching Session",
    },
  },
  "2": {
    "name": "North Sydney Property Investment Network",
    ...
  }
}
```

4 "urlname": "Actuaries-Social-Networking-Group",

- Key: "urlname"
- Value: "Actuaries-Social-Networking-Group"

```
1 {  
2   "0": {  
3     "name": "So  
4     "urlname":  
5     "members":  
6     "next_event  
7     "id": "  
8     "name":  
9   },  
10  "1": {  
11    "name": "Ea  
12    "urlname":  
13    "members":  
14    "next_event  
15    "id": "  
16    "name":  
17  },  
18  },  
19  "2": {  
20    "name": "No  
21  }  
22 }
```

- Key: "0"
- Value: nested JSON object
- Key: "1"
- Value: nested JSON object
- Key: "2"
- Value: nested JSON object

Powershell

```
$url = 'https://api.meetup.com/find/groups?&sign=true&photo-  
host=public&country=Australia&upcoming_events=1&text=actuarial&page=100&key=INS  
ERTYOURKEY'
```

```
Invoke-WebRequest $url |  
    ConvertFrom-Json |  
    format-table urlname, name, description |  
    tee 'd:\output.txt'
```

```
PS D:\> Invoke-WebRequest $url !  
>> ConvertFrom-Json !  
>> format-table urlname, name, description !  
>> tee 'd:\output.txt'  
>>  
  
urlname                                     name                                     description  
-----                                     -
```

Actuaries-Social-Networking-Group	Social Networking Actuaries Group	<p>It's been said that more than 80%...
Eastern-Suburbs-Property-Investment-...	Eastern Suburbs Property Investment ...	<p>WELCOME</p>...
Little-Bay-Property-Investment-Network	Little Bay Property Investment Network	<p>Live in or around Little Bay? Wan...

Jupyter Notebook Demonstration

This notebook will be published on [Actuaries Digital](#) as part of the *Analytics Snippet* series.

Association analysis (1)

Support: How popular an item set is

$$\text{Support } \{\text{🍎}\} = \frac{4}{8}$$

Transaction 1	🍎 🍺 🍲 🍗
Transaction 2	🍎 🍺 🍲
Transaction 3	🍎 🍺
Transaction 4	🍎 🍏
Transaction 5	🍼 🍺 🍲 🍗
Transaction 6	🍼 🍺 🍲
Transaction 7	🍼 🍺
Transaction 8	🍼 🍏

Source:

<https://algobbeans.com/2016/04/01/association-rules-and-the-apriori-algorithm/>

Association analysis (2)

Confidence. This says how likely item Y is purchased when item X is purchased, expressed as $\{X \rightarrow Y\}$.

$$\text{Confidence } \{\text{🍎} \rightarrow \text{🍺}\} = \frac{\text{Support } \{\text{🍎}, \text{🍺}\}}{\text{Support } \{\text{🍎}\}}$$

Association rules (3)

Lift: How likely item Y is purchased when item X is purchased, while controlling for how popular item Y is.

$$\text{Lift} \{ \text{🍎} \rightarrow \text{🍺} \} = \frac{\text{Support} \{ \text{🍎}, \text{🍺} \}}{\text{Support} \{ \text{🍎} \} \times \text{Support} \{ \text{🍺} \}}$$

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