

Miniproject 3: Clickmaniac

Assigned: 3/1/2018

Rankings close: 03/08/2018 6:00pm

Report due: 03/10/2018 5:00pm

1 Clickmaniac [100 points]

You may already know this, but our course¹ has a fan page on Facebook! We now have 118,000+ likes on the page (<http://www.facebook.com/caltech.clickmaniac>) since we started promoting it six years ago! Let us see how many more people we can get to visit and/or like the page.

In this assignment, we use the course Facebook page in order to give you a sense for what it's like to participate in an automated auction. Your assignment is to generate as many likes as possible to our Facebook page using the ads we provide you.

We're adding a twist and allowing you to experiment with using the Facebook Ads SDK. This makes the project more challenging, but also more engaging! If you haven't used any real-world SDKs or APIs before, then this is an important learning experience.

2 The assignment

An election is approaching and two of the largest organizations in the world are competing head-to-head: the Canine Cooperative and the Feline Federation. It is the goal of both groups to bring out their voters, even at the expense of the opposing party.

As expected in any election, the groups are not above mud-slinging. The Canine International Committee (CIC) and Feline International Committee (FIC) are focusing on two kinds of ads for their platforms. Half of the ads are designed specifically to push the interests of their animal (positive ads). For example, the CIC might highlight how many dogs get sent to the pound each year and encourage viewers to donate to a nearby shelter today to combat this problem. The other half of the ads smear the opponent (negative ads). For example, the FIC might point out that a disproportionate number of animals who enter shelters as strays and are returned to their owners are dogs. The committee can then use this statistic to point out that cats are in much more need of help around the world. You, as a member of CIC or FIC, have the object of garnering as many votes (likes) as possible from your constituents, since this helps spread your message and draw out voters.

You are free to choose whether you will be a part of the CIC or the FIC.

3 Details and Terminology

You will be advertising for our page on Facebook two ways: through Facebook's own trusty User Interface (Ad Manager), and experimentally via the SDK/API. One of your campaigns will be run through the SDK, and one will be run through the API - additionally, one of the campaigns will be positive, and one will be negative (your choice). We will first start by giving you an overview of how the project is set up before diving into more specific details.

¹...though the course name has changed since we created the page and Facebook won't let us change the name of the site :(

We have created a Facebook Business Account for the purposes of this experiment and have given one member from each group access to this account. That same member has also been made an advertiser for the page. Contact the **CS 144 TA Mailing List** (cms144.caltech@gmail.com) if you feel that more than one member of your group needs access.

At a high level, you will be figuring out how to target ads on Facebook in order to get the most page likes and visits for our class page. Let's go over some basic terminology:

- An *Ad Campaign* (or simply Campaign) is a container for your Ad Sets, and it defines your advertising objective: in our case, promoting a page. Each team will be assigned 2 campaigns, one to work with through the UI (called "team_name UI"), and one to manipulate programatically through the python SDK (called "team_name SDK"). Your limit per campaign is **\$2.00 a day**. (This means that you will be spending a total of **\$4.00 a day** across your two campaigns.)
- An *Ad Set* is a module inside an Ad Campaign². An Ad Set defines your audience targeting, budget, schedule, and bid price. You'll want to create more than 1 Ad Set to effectively allocate your budget, and the daily budgets of each Ad Set within the Campaign should add to \$2.00. Note that *within* an Ad Set, you can't really effectively balance how each Ad is served. You want to balance budget *across* Ad Sets.
- An Ad is the "front-end": what your audience will see. We will give you these ad pictures and text directly, but you can make up your own slogan (and send it to cms144.caltech@gmail.com for approval) if you would like.

We **highly recommend** taking a look over the help docs at <https://www.fb.com/business/help/144507869019360/>.

4 Using Facebook Ads Manager

You need to become familiar with the Ads Manager, which is Facebook's UI for creating Ads, setting budgets, selecting audiences, etc. Remember that only one of your team's Ad Campaigns will be set up and changed through the UI, but regardless you'll see results in the form of a leaderboard for all teams here on the Ads Manager!

You can access the Ad Manager at (<https://www.facebook.com/ads/manage/campaigns/>). You might need to log into Facebook if your browser does not have your credentials saved. Click on "Account: *Your Name*" under the top navigation bar, and then select "**Clickmaniac 2017-2018**". Alternatively, this direct link³ should also work for the person who has been added to the account. Here's an overview of what you need to know from this screen:

- (a) *Your campaigns*: You will see a listing of campaigns. We have created (2) campaigns for each group with the team name as the campaign name, followed by "UI" or "SDK". For example, if your team name is "kanyeblessed", then your campaigns are called "kanyeblessed UI" and "kanyeblessed SDK". For the rest of this section, "campaign" will refer to your UI campaign, since that is the only one you are allowed to work with through the UI. You may only create ads for the campaign corresponding to your team. To ensure this, click on your campaign name before you create an ad. If you forget to do this, it will ask you to enter a campaign name. You can click "Use Existing Campaign" near the top of the screen and then select your campaign.

²A rigorous philosophical treatment justifying circular definitions is out of the scope of this writeup.

³https://business.facebook.com/ads/manager/account/?act=196943804042546&business_id=196941527376107

Both of your campaigns should have a total budget of exactly \$2.00 per day and should be scheduled to run from 03/06/18 1:00 AM to 03/08/18 6:00 PM. Note that you cannot wait until the last minute to advertise because you have to spend the two dollars each day or the money is gone. Although Facebook will try to spend money later, in case you forgot, this is not guaranteed. You can configure almost everything in your campaign as you see fit, but you should not change the budget or the schedule.

- (b) *Creating your ads:* In order to put everyone on a level playing field and let the focus of the assignment be on “ad targeting” rather than “ad creation” we have created a list of ads that you can choose from. The ads are available at <http://courses.cms.caltech.edu/cs144/homeworks/clickmaniac.zip>. You do not have to use all the ads we provide.

We have not created the ads for you on Facebook though, so that you can have complete freedom in targeting and bidding. On the Ad Campaigns page, click on your group’s name (under “Campaign Name”). To create an ad on Facebook, click on the “+ Create Ad Set” or “Create Ad” button in your campaign page. We have just created a test Ad Set within each campaign, which you should either modify and turn on, or simply ignore.

For the objective, choose “Engagement” and then “Page Likes” (in principle, we are fine with the objective being something different as long as the ad is associated with the Page. However, please keep in mind the budget and check the grading section below). In the URL field, manually enter the URL of our Facebook page or select it from the drop-down box if it is available. Make sure the correct campaign is selected.

You may change any setting you like (other than the *Restrictions* listed on the next page). However, you must only create ads within your own campaign and keep the objective as “Page Likes”.

Note that the ad approval process may take anywhere from a few hours to a day, so be sure to start early in order to make sure that you have ads on which to spend the entirety of your budget each day.

- (c) *Restrictions:* **You are not allowed to create ads other than the ones we have provided you. That means the images, titles, and text must remain *exactly* the same.** Your goal is to target and bid the ads effectively. You’ll be able to see the list of other groups’ campaigns in the main page, and you are allowed to click on the TAs’ campaign to see our ads and how we are performing, but **you are NOT allowed to click on, view, or edit the ads/campaigns of any other groups, and you are not allowed to edit the TAs’ ads/campaign.** Remember that you are limited to spending \$2.00 per day. If you notice you are spending more than that, pause your ad and let us know.

Visit <https://www.facebook.com/business/products/ads> (and the links therein) for an introduction to advertising on Facebook. Don’t wait to set up your campaign – start working on your campaign ASAP so that you have time to get help from the TAs if you run into difficulties or have questions.

You can customize columns in the Ads Manager page to see how well the other groups are performing, but while viewing any of these performance results, ***you cannot click on other campaigns’ ads to see the targeting and bidding strategy.*** There are quite a few metrics that show up in the ‘Customize Columns’ pop-up of the Ads Manager that you should be aware of – *Impressions, Clicks, Click-Through Rate, Ad Reach*, and a few social metrics. To understand what they are, hover over the items. If you have any questions about what these terms mean, or if the descriptions are ambiguous, feel free to sound off through comments for this homework on Piazza.

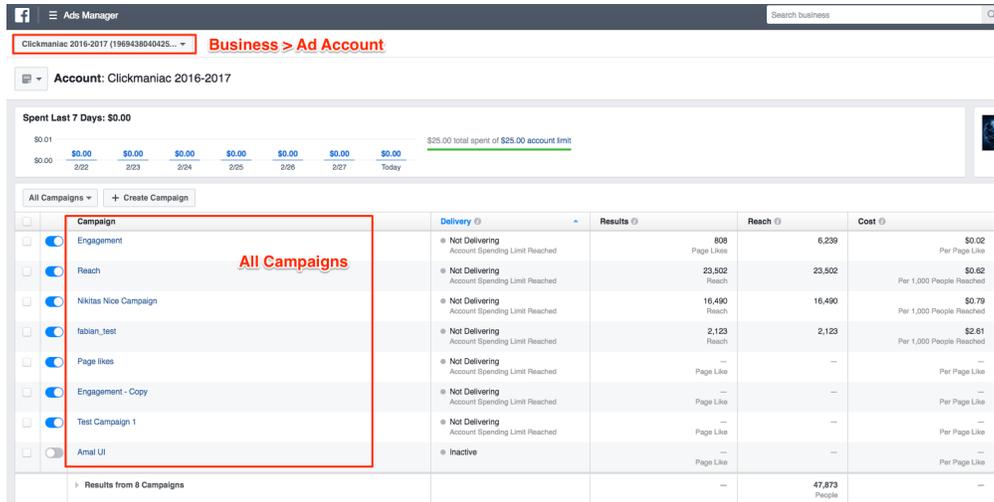


Figure 1: Here, you can see all campaigns listed in the left bar, and the correct Business/Ad Account listed. You should see your “team_name UI” and “team_name SDK” campaigns listed.

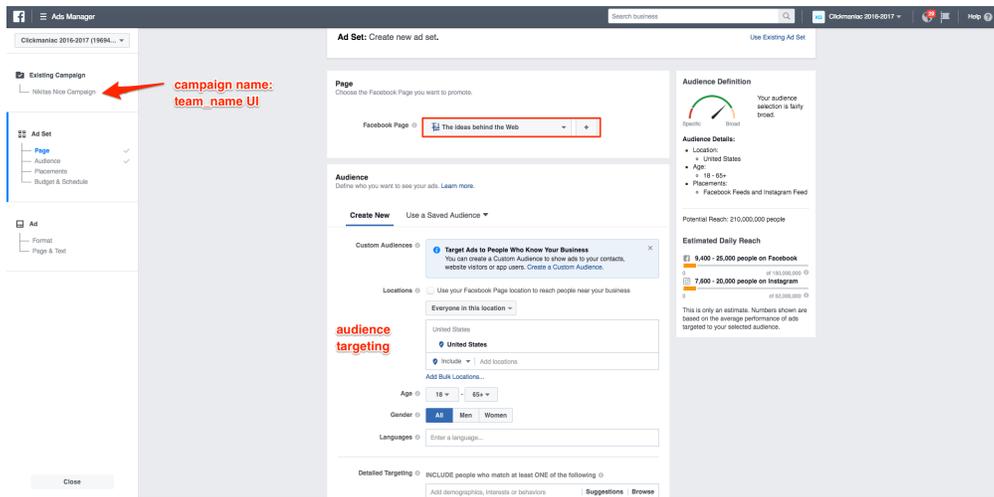


Figure 2: Creating a new Ad Set within your Campaign. Note that you should only do this for your campaign titled “team_name UI”. Again, **make sure** your daily budget for all Ad Sets within a campaign is \$2.00.

5 Using the Facebook Ads SDK

As you know, you will have to use the Facebook Ads SDK for a portion of this miniproject. You will write a script that can automate what you're manually doing through the Ads Manager UI as we describe above: it will look at ads insights, make some decisions (with or without randomness, your call!) and reallocate your daily budget, targeting, and other variables you want to play with. *We highly recommend* using the Python SDK, and it's what we will support (please email us if this is a significant issue).

This portion of the assignment is fairly new, and we will likely run into some kinks, and sometimes the SDK can have limitations. If anything breaks on our end, please notify us on Piazza, and we will do our best to fix it!

5.1 Installation

You can find the SDK documentation here: <https://github.com/facebook/facebook-python-ads-sdk>. The installation instructions are also on that page, but all you should really need to do is execute `pip install facebookads` or `pip3 install facebookads` for python or python3 respectively. If you don't have pip, you can try `easy_install pip` or see <https://pip.pypa.io/en/stable/installing/>.

5.2 Authentication

Because we want to manipulate specific campaigns (i.e. the campaign named "team_name SDK") with the SDK, you will need to authenticate your Facebook credentials in the python script. Under the **Bootstrapping** section of the Github document linked above, you should see that you need (3) things:

- `app_id`, `app_secret`: To access any of the Facebook APIs (we are working with the Marketing API and specifically the Ads Management portion here), you need to use a Facebook Developer App. The details are not crucial for our purposes, but one person on your team will be added as a *developer* on a Facebook App called 'cs144-clickmaniac'. Once you've been added to this app, you should be able to access the app page from here: <https://developers.facebook.com/apps/> or more directly here: <https://developers.facebook.com/apps/299363293779254/dashboard/>. From this dashboard, you should directly see the `app_id` and `app_secret`.
- `access_token` This is specific to a combination of your Facebook Account and the app you're using the API with. The best way to get this token is via the Graph API Explorer at <https://developers.facebook.com/tools/explorer/>. Since you don't want your `access_token` to expire, you'll have to "extend it". See **Appendix: Authentication Walkthrough** for details.

We will also be holding special office hours Thursday evening and Friday during class in order to guide you through authentication. Make sure someone from your group attends one or both of these.

5.3 Writing your Script

There are a few (purposefully minimal) rules to writing your python script, which will interact with the Facebook Ads SDK, and which we will run continuously as described in the next section.

- Remember that you are *only* allowed to manipulate the parameters of *your SDK campaign* (and, notably, you are *not* allowed to manipulate this specific campaign through the UI). You should use the `campaign_id` that is listed in the sidebar as soon as you try to Edit this corresponding Campaign:

apart from checking this, you should use the SDK to create new ad sets with the campaign, activate them, define their respective audiences, and shift budget between them. Of course, if you are doing some of these things only once, no need to include them in the script you will run continuously.

- You should be able to write to disk within your script, and load a file back in. This is completely optional, and certainly not required for clever budget/audience allocation or insight collection. If File I/O doesn't seem to work, contact the TAs.
- All authentication (as described above) should be included within the file.
- You are constrained to a 1 minute time out on the remote machine where we will run this (see below).

5.4 Running Your Script

Once you've written a script that can automatically fetch ad insights and change parameters, we'll be running it *once an hour*, every hour. For this purpose, we have a very simple uploader at <http://35.161.76.216/>. Here, you can see uploaded scripts from all teams, see when it was "Last Updated"(when the script source was changed) and "Last Ran" (it may not run because of timeouts, errors, etc). As you can see, this is a very barebones framework: please do not shake vigorously. Only one person on each team should submit, which you can do by clicking "Upload your Script" in the header. Here is an explanation of each field:

- Team Name: This should match with the team name you sent us via email at the start of the project.
- File: Your python script! You are limited to one file, so your action should be entirely self-contained. This means that you'll have to authenticate within this script.
- Email: An email of someone on your team. This person will receive all automatic communication from the uploader.
- Secret Key: A simple (made-up) passphrase that you'll need when updating your script (so you can't accidentally update other teams' submissions!).

Once you upload your script successfully, you should get a confirmation email (to the email you entered in the form) with the secret key and your submission attached. To update your script, simply click "Update" from the main page, and enter your secret key (don't forget to attach a new file). You shouldn't change any other fields here.

To help you debug what's happening on the remote machine, you should get emailed error logs every time your script runs (the subject of the email will be "[CS 144 Clickmaniac] Script Error Log").

Because we want the scripts running from this setup, you are free to test locally on your computer but we ask that you do not repeatedly run it in order to actually affect your campaign from your local machine. All the heavy lifting that your script does should be automated, and based on insights: hence, it should happen on the remote machine on the hour!

5.5 Battle of the Scripts

Once the sandbox phase of Clickmaniac is over, on March 03/08 at 6pm, we will disallow updating the API scripts, and whatever submission you have online will be treated as your "competition" submission. From then on (and until 03/10 at 9 AM), we will re-enable each team's SDK campaign, and have them continue to run every hour. The team with the highest gained page likes from this point on from their SDK campaign will be crowned the Clickmaniacs!

6 Grading

- **[60 points]** As a group, you need to turn in a report describing your approach and what you learned from the experience. You should also address why certain targeting techniques worked in your report. The report must describe the contribution of each group member to your group's effort. **The report is due on March 10 at 5:00pm on Moodle.**
- **[5 points]** Generate at least 30 clicks from EITHER your UI or SDK campaign.
- **[5 points]** Generate at least 60 clicks from EITHER your UI or SDK campaign.
- **[5 points]** Generate at least 10 likes from EITHER your UI or SDK campaign.
- **[5 points]** Generate at least 40 likes from EITHER your UI or SDK campaign.
- **[10 points]** A working API solution (aka, you submit code that runs for your SDK campaign).
- **[5 points]** Your SDK campaign beats TA Team A.
- **[5 points]** Your SDK campaign beats TA Team B.

This grading scheme might change if it becomes obvious that it is vastly unfair (i.e., if nobody has working code, etc.)

7 Hints/Guidelines

- All ads need to be approved by Facebook before they go live (and this will cause a delay). There should not be a problem with getting the ads approved as we had tested them to ensure they pass Facebook's approval process (however, please alert us immediately if you have problems). You can target different people with the different ads we have for you and will want to adjust your target audience each day based on the performance in the previous day.
- Note that Facebook suggests a range of maximum bid values for every ad that you create. You can choose to adhere to that, or experiment with lower bids and see what happens (remember, the daily budget is limited!)
- The honor code applies to all the rules and restrictions of this assignment. If you suspect a violation (for example, copying), report it immediately, and it will be investigated.
- To immediately return to your actual Facebook account, click on the gear icon in the top right hand corner and then click "Use Facebook as ...".

Many thanks to Anthony Chong who helped us set up this assignment the first time back in 2011!

8 Appendix

8.1 Authentication Walkthrough

To obtain your access token, you need to use the Graph Explorer. The following screenshots will walk you through this process, starting with the URL at <https://developers.facebook.com/tools/explorer/>. At various points, you may be prompted for your Facebook password.

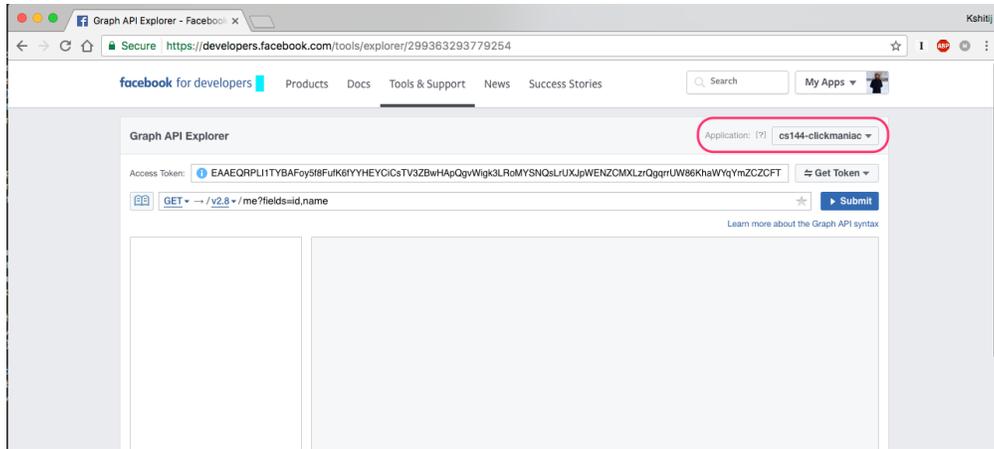


Figure 3: Be sure that our app, “cs144-clickmaniac” is selected in the Application Box.

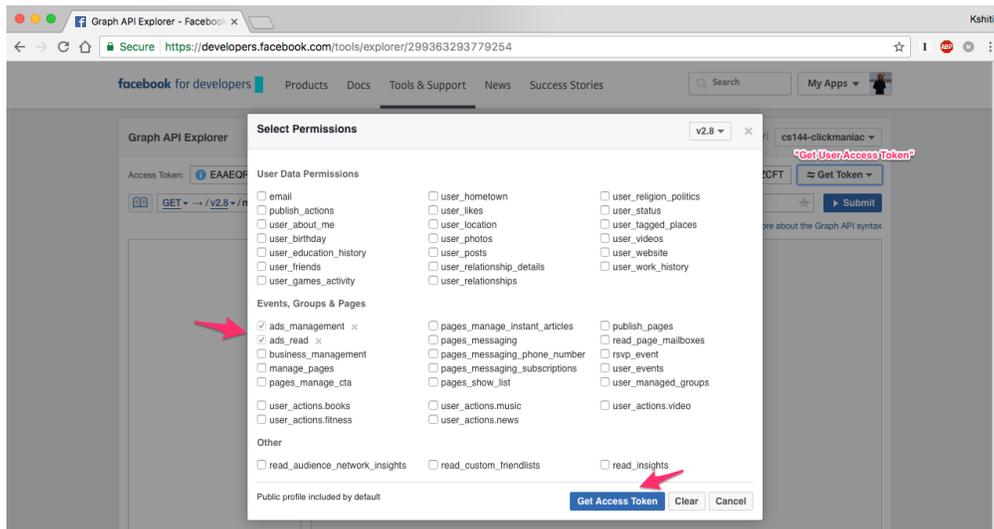


Figure 4: Click ‘Get User Access Token, and the following dialog will pop up. Ensure that ‘ads_management’ and ‘ads_read’ are selected (perhaps even greyed out). Click on ‘Get Access token’.

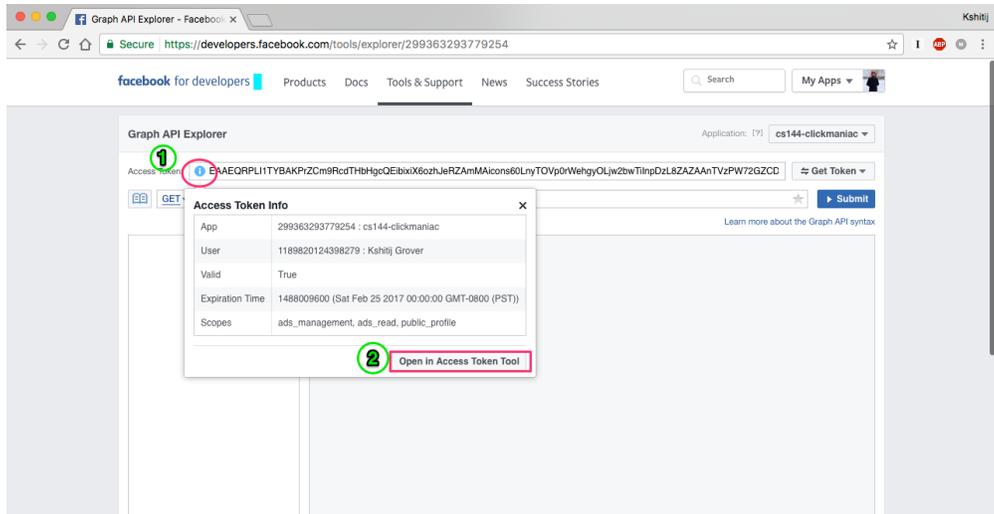


Figure 5: To extend the access token, first click the 'info' (i) icon, and then click 'Open in Access Token Tool'.

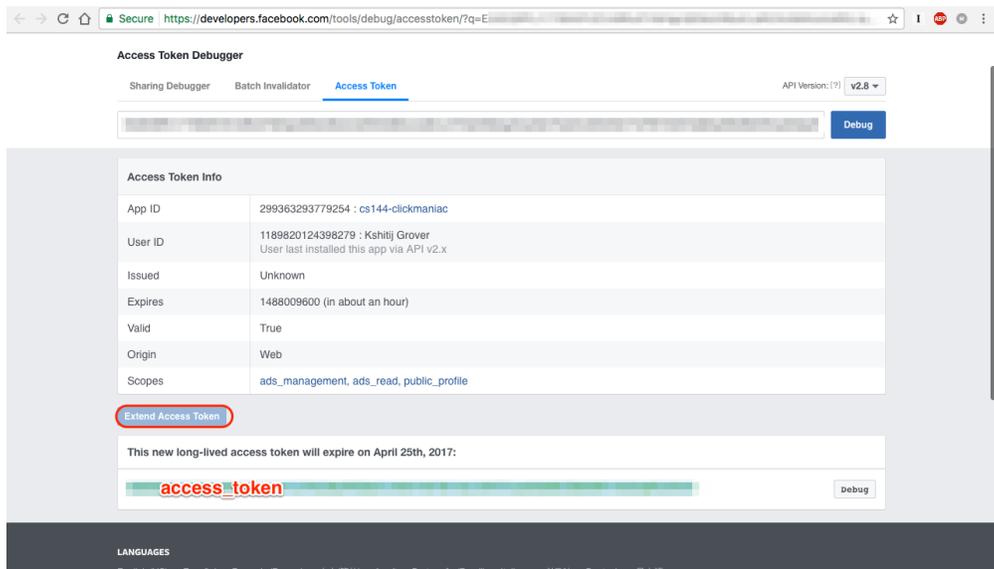


Figure 6: Click 'Extend Access Token'. Your access_token should be displayed here.