# Ad Quality

## Background

We see thousands of new and distinct creatives on our platform daily (coming via the DSPs that we are integrated with). These creatives need to be manually classified or need to be classified using automated tools like AdSnoop & Confiant in order to determine if the creative meets the ad quality requirements of our publishers or not. Our current ad ops team can manually classify around 2,000 creatives per day, but we see a lot more creatives each day. It is in the best interest of all parties (publishers, DSPs and us) that the creatives are accurately classified as soon as possible.

## Goal:

Apply machine learning to determine which creatives from a list of uncategorized creatives should be prioritized and sent for manual review so that the ad ops team is manually scanning the most suspicious creatives first. This would help reduce the creative related issues on our platform. Note that here it is important that we send all unacceptable creatives for manual review and if in this process we send some potentially high-quality creatives for manual review too then that is fine i.e. when in doubt err on the side of caution and send the creative for manual review.

## Input:

Input data set that can be used for training and validation can be downloaded from [here](https://pubmaticinc1-my.sharepoint.com/:x:/g/personal/dinesh_kandhari_pubmatic_com/Ea2Dxvl-P8NOqsjU6z_8Ug0BwqHbFcuWqvRFXeAKvFoezA?e=94NLnz)

## Data Description

Each row in the file represents a unique creative and has nine columns. A brief description of each of the nine columns is as follows -

1. ucrid – This numeric identifier is used to uniquely identify a creative on our platform and is generated using a combination of other features such as the DSP from which the creative was received, the corresponding creative identifier used by the DSP etc.
2. dspid – The id of the DSP on our platform from which a specific creative was received
3. landing\_page\_url – This represents the domain of the page that the creative points to i.e. the user would be taken to this domain if the user clicked on the creative.
4. Ad Size Id – A numeric identifier used to uniquely represent the ad size of the creative. Creatives of the same size would have the same ad size id. Mapping of ad size id to actual ad sizes can be provided if needed.
5. Geo Id – This represents the id of the country where this creative was first seen. Note that the same creative could have been served in multiple countries but we record just the first country where this creative was observed on our platform
6. Platform Id – A numeric value indicating the platform where the creative was to be served. 1 represents desktop, 2 is mobile web, 4 is iOS mobile app, 5 is Android mobile app. Any other value here indicates that the exact platform is unknown.
7. AdSnoop Classification – A value of 1 here indicates that the creative was determined by AdSnoop as being of acceptable quality whereas a value of 0 indicates that the creative quality was poor and not up to the mark i.e. it resulted in errors on being rendered, creative code was malformed, had forceful redirects, spoofed the landing page URL, contained malware, had auto play audio or video etc. A value of NULL indicates that the classification is unknown.
8. Confiant Classification – A value of 1 here indicates that the creative was determined by Confiant (an external technology partner that we work with) as being of acceptable quality whereas a value of 0 indicates that the creative quality was poor and not up to the mark i.e. it resulted in errors on being rendered, creative code was malformed, had forceful redirects, spoofed the landing page URL, contained malware, had auto play audio or video etc. A value of NULL indicates that the classification is unknown.
9. Actual Classification – A value of 1 here indicates that the creative was determined by our ad ops team via manual review as being of acceptable quality whereas a value of 0 indicates that the creative quality was poor and not up to the mark i.e. it resulted in errors on being rendered, creative code was malformed, had forceful redirects, spoofed the landing page URL, contained malware, had auto play audio or video etc. This would be target / label that the ML model is expected to predict given the other 8 attributes above.

Please refer to the appendix section for data sets that include additional information like IAB categories of the landing page url as well as the raw classification values.

Please reach out to Dinesh Kandhari or Abbas Suterwala in case you have any queries or suggestions related to the data set.

**Test data set** that would be used to measure the accuracy of your trained and final ML model can be downloaded from [here](https://pubmaticinc1-my.sharepoint.com/:x:/g/personal/dinesh_kandhari_pubmatic_com/EZOVMUZup5VGhM2xX1SC0akBVk56SSjjwI7TYF4DtyQaTQ?e=RF8fvA). Please do not use the test data set for training nor tuning the model in any way. Please use this only to present the results around how accurate the trained model was while classifying creatives that were not seen during the training and validation phase.

## Output / Deliverables

* A logistic regression model that predicts if a creative is of acceptable quality or not. Input would be the first eight attributes from the data description section above and the actual classification would be what the model would predict.
* F1 score, precision, recall, accuracy and the confusion matrix for the above model corresponding to the test data set. Please share the corresponding ROC curve and AUC as well.
* A brief description of the proposed solution & it’s pros and cons.
* Details of any other models that you tried that performed better than the tuned logistic regression model.

## **Part 2 – Creative classification**

### Background

Some publishers are more sensitive to creative violations than others. For such publishers we enable strict mode i.e. unclassified creatives are not served on such publishers. This means that until a creative is classified via automated tools or via a manual review (which could take several minutes, hours or days) they cannot be served on such publishers which in turn negatively affects monetisation.

### Goal

Build a ML model that does not use AdSnoop classification nor Confiant classification as input features from the above data set and predicts the actual classification i.e. is the creative acceptable or unacceptable. Optionally try to predict the AdSnoop and Confiant classifications as well. Here again start with logistic regression, tune it and then use it as a baseline to check if any other models perform better than this logistic regression model.

### Training and Test Data Sets

The same training and test data sets provided above can be used for training, validation and testing (only difference being AdSnoop and Confiant classification should not be used as features and should be treated as labels to be predicted instead) i.e. use only the first six columns as inputs for training the model.

## Appendix

In case you are looking for the actual creative classification values as determined by Confiant, AdSnoop and manual categorisation instead of 0/1 labels and / or would like to determine the IAB category of the landing page associated with the creative then you can download the corresponding training dataset from [here](https://pubmaticinc1-my.sharepoint.com/:x:/g/personal/dinesh_kandhari_pubmatic_com/EcFJVz7jwoFBixHTqgRBehcB604Rx6nIXulMyZhU6OmiFA?e=hQL1Mg) and the test data set can be downloaded from [here](https://pubmaticinc1-my.sharepoint.com/:x:/g/personal/dinesh_kandhari_pubmatic_com/EfEb_w2sAFRMi0td0lsN6fMBNzDIRUMjQbCvuAEkwxU1Hg?e=Aqyn0j). Human readable names corresponding to the IAB category ids can be found [here](https://pubmaticinc1-my.sharepoint.com/:x:/g/personal/dinesh_kandhari_pubmatic_com/EZQEf2l7P_dGvyph4bYRF5MBVERXPlTAnWnZzYrtOvshbQ?e=yglA8f). In case the creative classification is not known or the IAB category of the landing page url is not known then the column would be blank or have NULL values. Kindly note that a creative can be classified into more than one category and in such cases the values are separated by ::

|  |  |
| --- | --- |
| **Creative Classification Code** | **Description** |
| -102 | Video Error Fatal |
| -101 | Video Error On Parse |
| -6 | Forceful Redirect |
| -5 | SpoofedLPU |
| -4 | HTML5 |
| -3 | Malware |
| -2 | Blank Ads |
| -1 | Unidentified |
| 0 | Unknown |
| 1 | Audio Ad (Auto Play) |
| 2 | Audio Ad (User Initiated) |
| 3 | Expandable (Automatic) |
| 4 | Expandable (User Initiated - Click) |
| 5 | Expandable (User Initiated - Rollover) |
| 6 | In-Banner Video Ad (Auto Play) |
| 7 | In-Banner Video Ad (User Initiated) |
| 8 | Pop (e.g., Over, Under, or upon Exit) |
| 9 | Provocative or Suggestive Imagery |
| 10 | Shaky, Flashing, Flickering, Extreme Animation, Smileys |
| 11 | Surveys |
| 12 | Text Only |
| 13 | User Interactive (e.g., Embedded Games) |
| 14 | Windows Dialog or Alert Style |
| 15 | Has audio on/off button |
| 16 | Ad can be skipped (e.g., skip button on preroll video) |
| 44 | Auto Refresh Ad |
| 52 | Flash Ad |
| 53 | Image Ad |
| 54 | Animation (GIF only) |
| 55 | Flash (including Pixels) |
| 101 | Video InStream |
| 102 | Video Flash Only |

The following codes are considered to be unacceptable: -102, -101, -6, -5, -3, 6, 7, 1, 2.