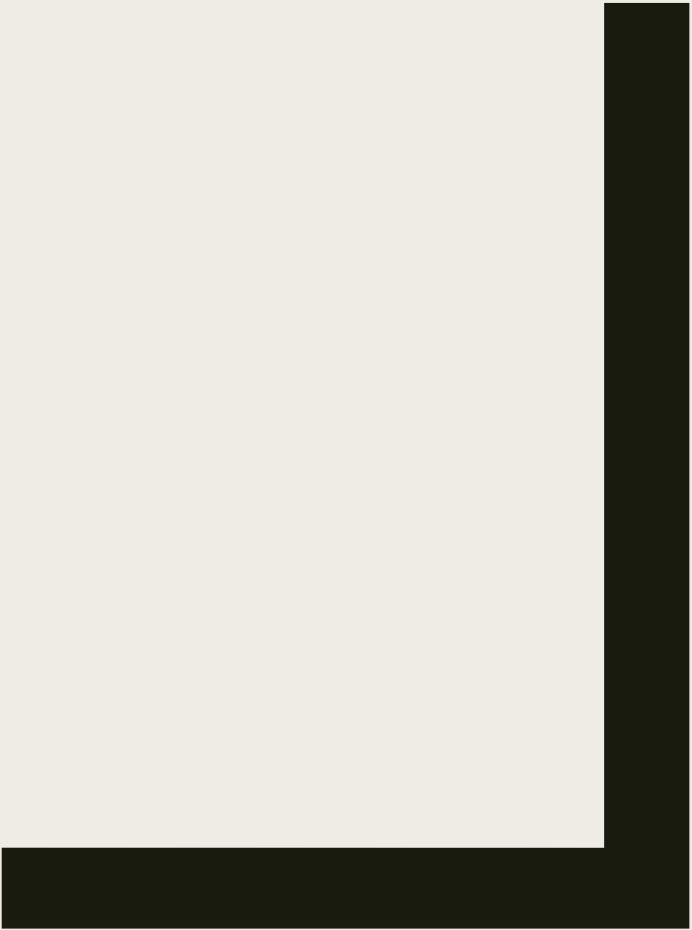


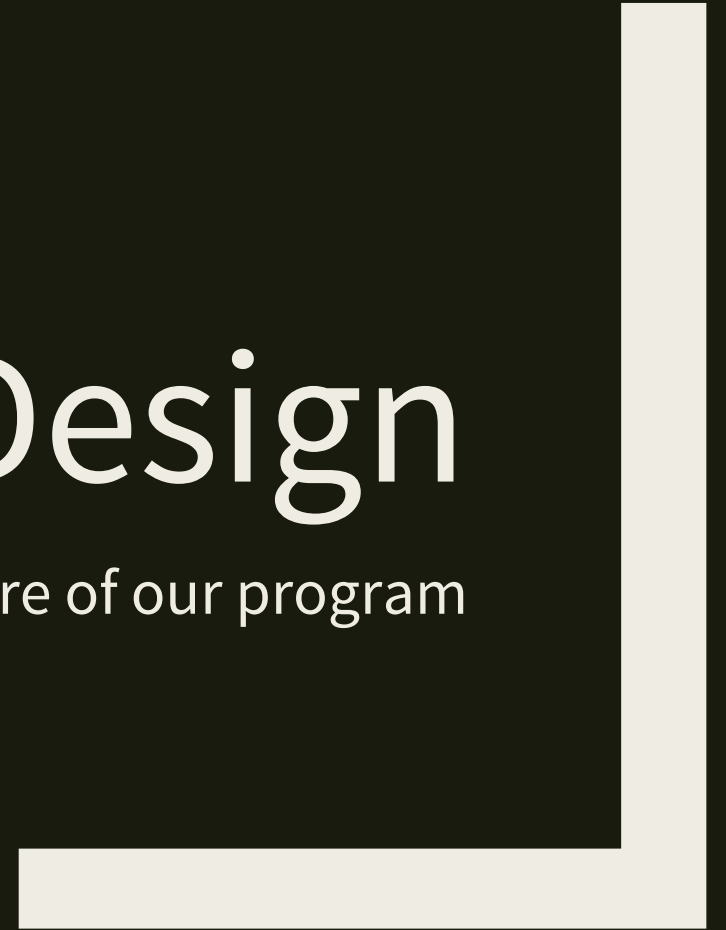
CS2108

Assignment 1 Report



Design

The architecture of our program



UI_search.py

querylogic.py

*Sends image
details and
search details*

*Sends details to
retrieve image*

Visual
Keyword

Image
retrieval

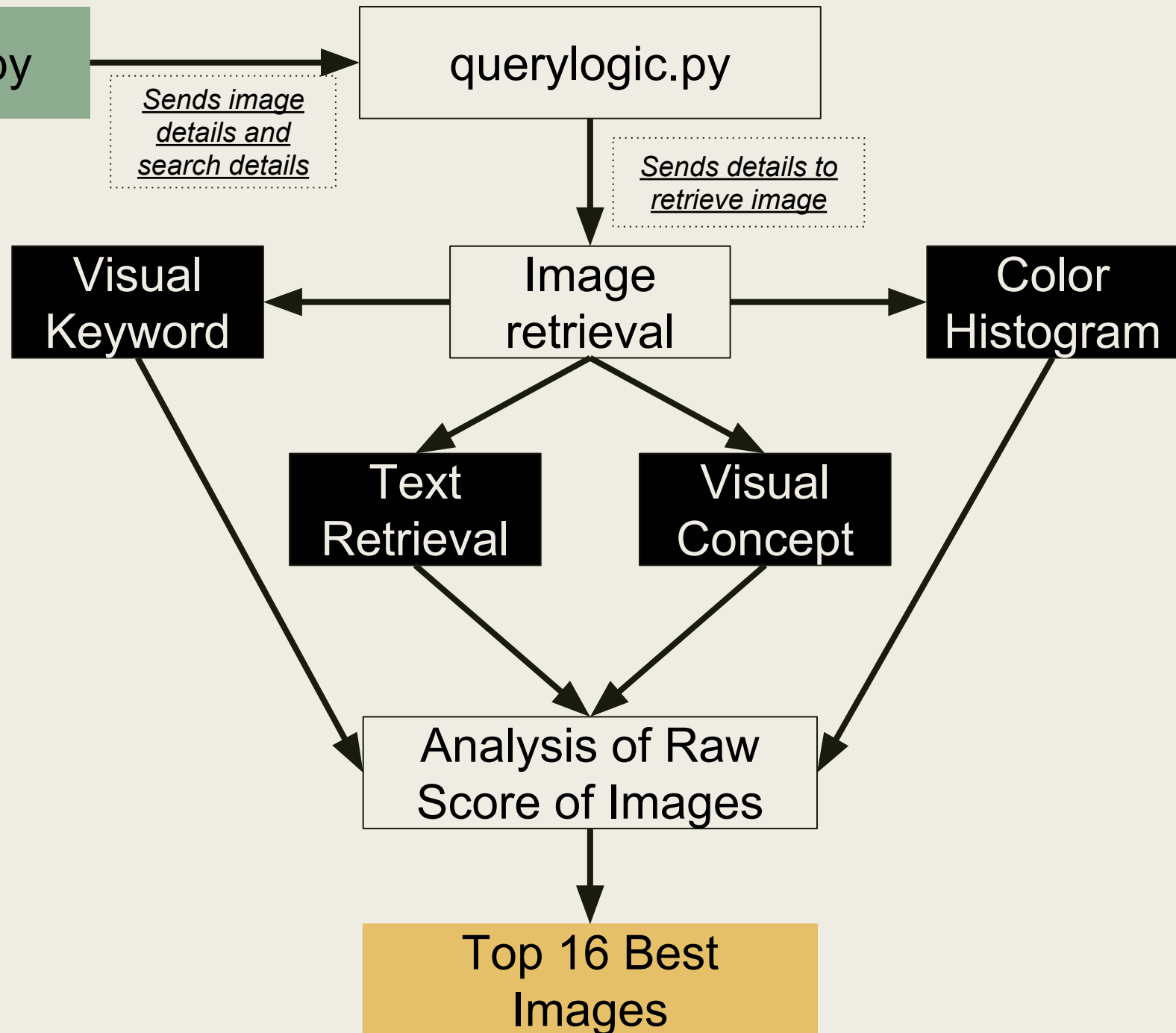
Color
Histogram

Text
Retrieval

Visual
Concept

Analysis of Raw
Score of Images

Top 16 Best
Images



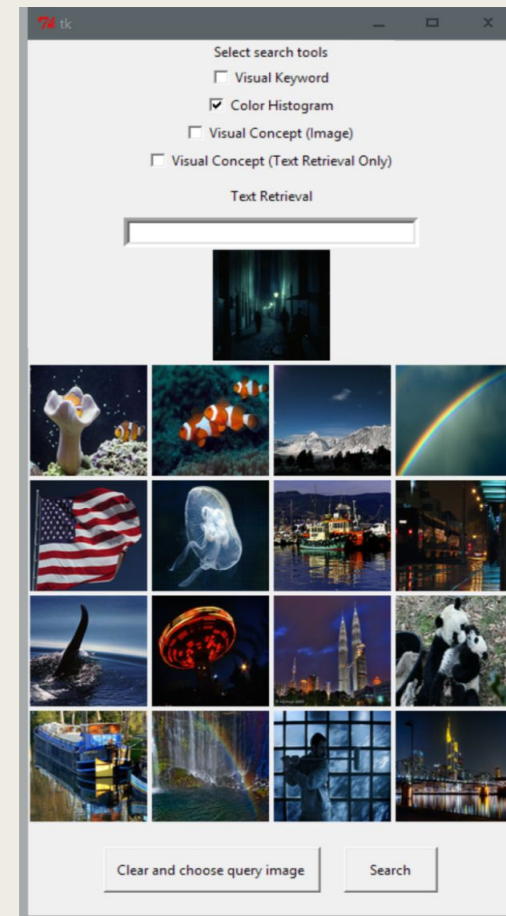
Program Structure

The specifics of our searching features



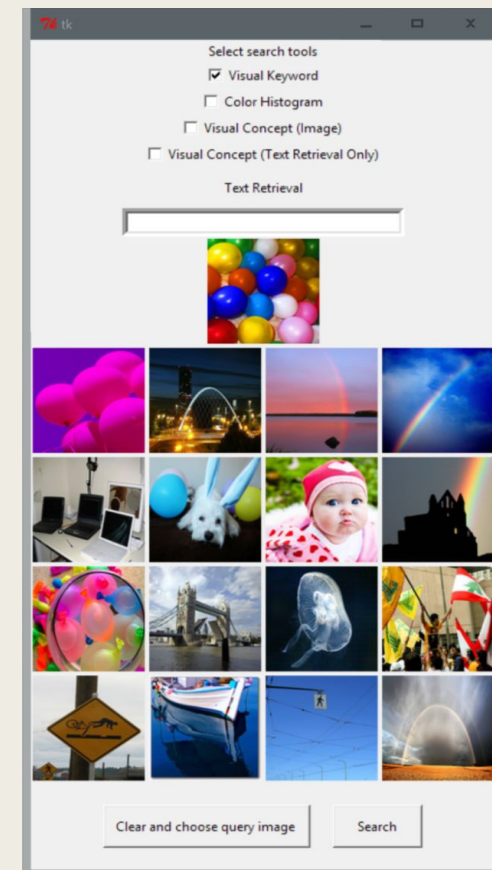
Color Histogram

- Implementation of the colour histogram
 - *OpenCV's Python library*
- cosine similarity measured to calculate similarity



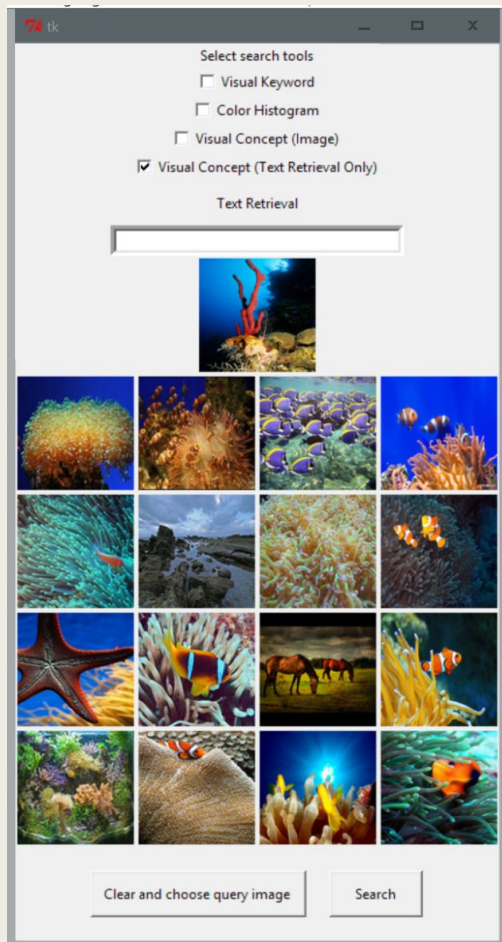
Visual Keyword Surf

- Tools used: openCV's Speeded Up Robust Features (SURF) instead of SIFT
 - *Fast*
 - *More keypoints*
- Initiation: loadSurf
- Query: keyword_matching(filename)
 - *cv2.FlannBasedMatcher*
 - *knnMatch for euclidean distance*
- Can be improved in accuracy with: RANSAC algorithm

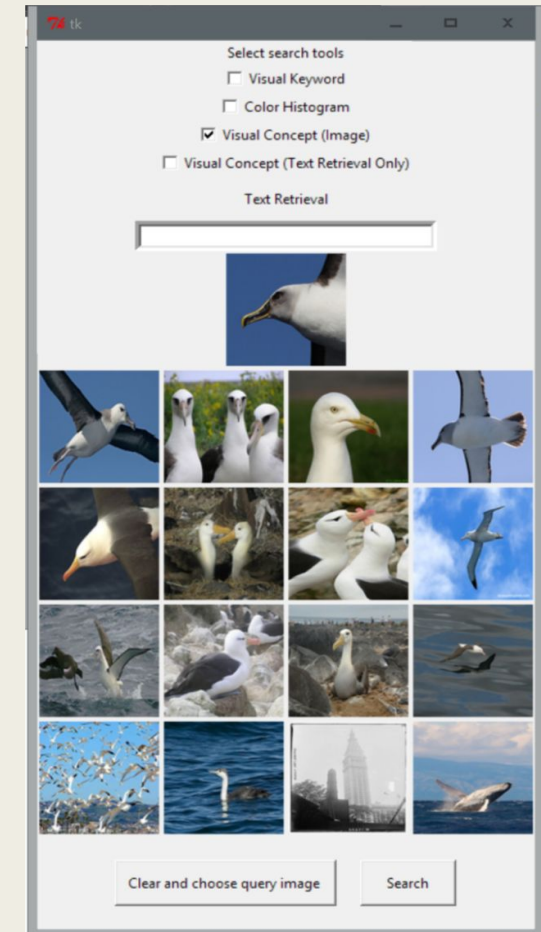


Visual Concept

Semantic Feature



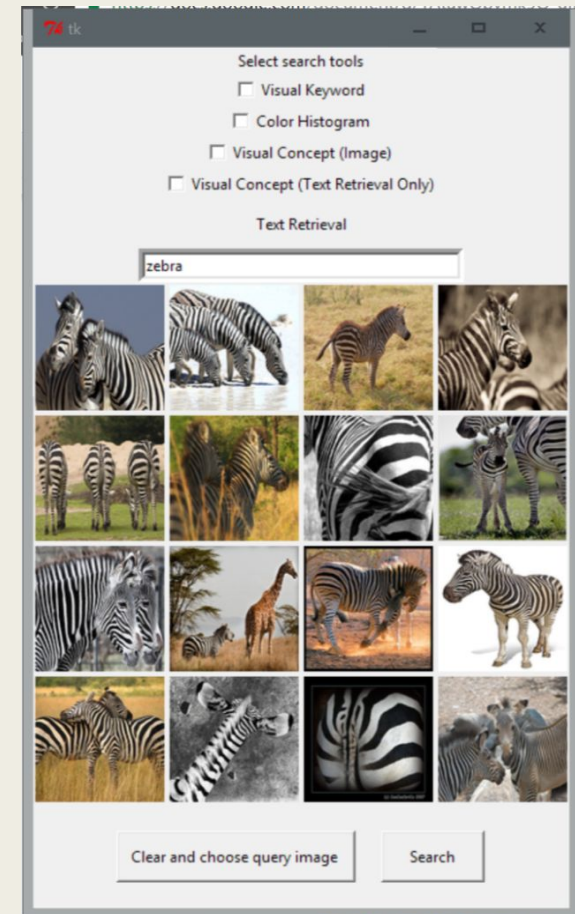
- Used given feature: Semantic Feature
- Visual Concept descriptors are cached first
- cosine similarity ranking for the 1000-dimension visual concept descriptors
- `compute_search_score_of_vis_concepts.py`



Text Retrieval

Semantic Feature

- Case folding and punctuation removed
- Inverted index structure used for our dictionary
- Index_text_tags.py, testset_text_tags_postings.txt and trainset_text_tags_postings.txt used for program
- Query expansion is possible through the use of visual concept detector
- tf-idf weight and cosine similarity calculations used to analyse image relevance



Analysis of Raw Scores

$$\underline{a \text{ (VK)} + b \text{ (CH)} + c \text{ (VC)} + d \text{ (TEXT)} = \text{final similarity score}}$$

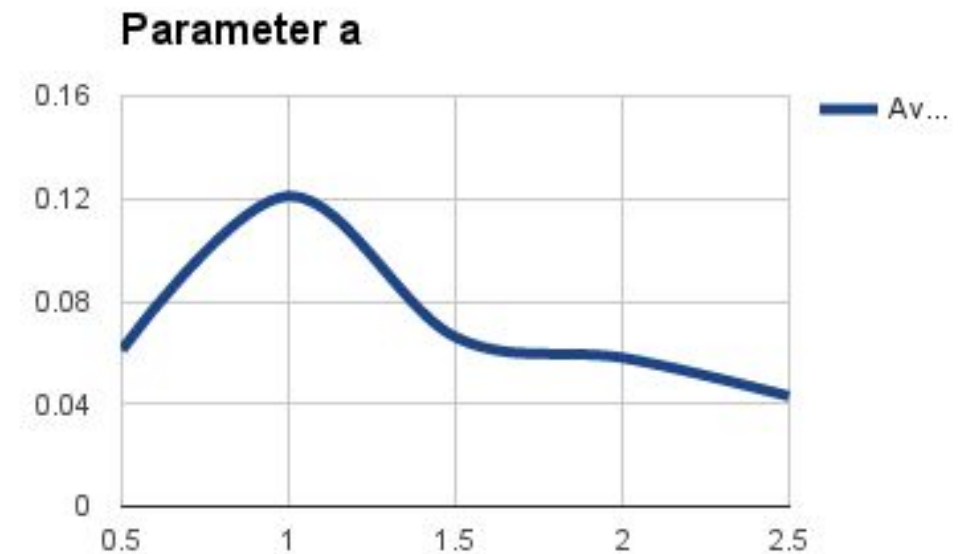
- VK: Visual Keyword
- CH: Color Histogram
- VC: Visual Concept
- a,b,c,d: Weights for Visual Concept

Analysis



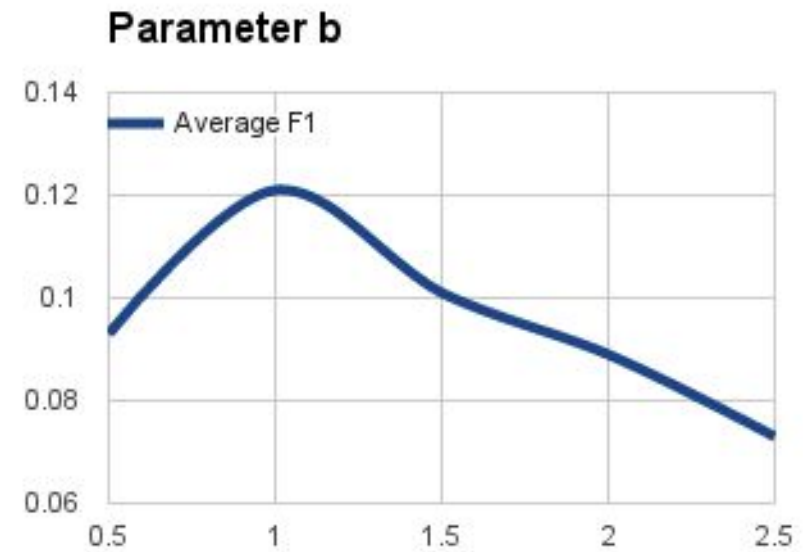
Visual Keyword

| a (VK) | Average F1 |
|--------|------------|
| 0.5 | 0.061 |
| 1.0 | 0.121 |
| 1.5 | 0.066 |
| 2.0 | 0.058 |
| 2.5 | 0.043 |



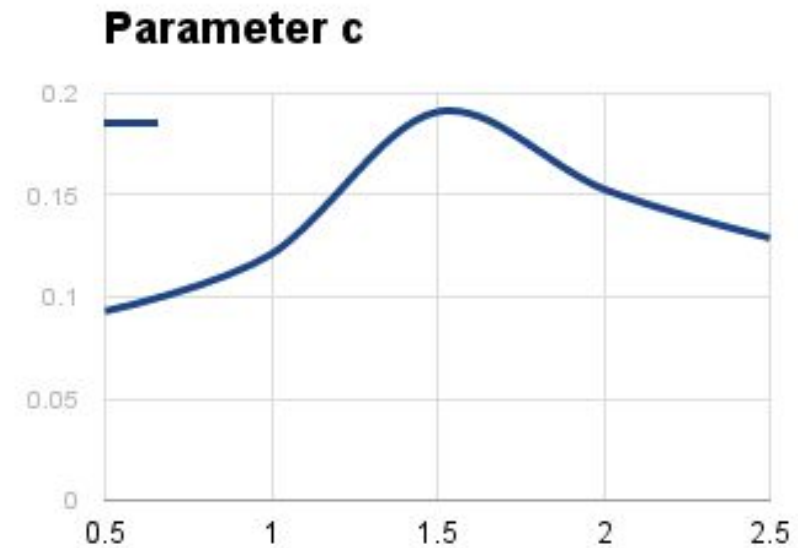
Color Histogram

| b (CH) | Average F1 |
|--------|------------|
| 0.5 | 0.093 |
| 1.0 | 0.121 |
| 1.5 | 0.101 |
| 2.0 | 0.089 |
| 2.5 | 0.073 |



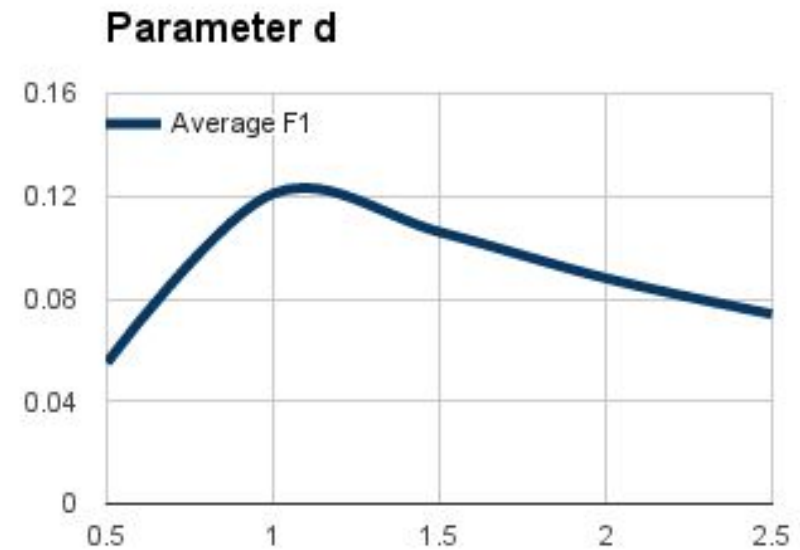
Visual Concept

| c (VC) | Average F1 |
|--------|------------|
| 0.5 | 0.093 |
| 1.0 | 0.121 |
| 1.5 | 0.191 |
| 2.0 | 0.153 |
| 2.5 | 0.129 |



Text

| d (TEXT) | Average F1 |
|-------------|---------------|
| 0.5 | 0.055 |
| 1.0 | 0.121 |
| 1.5 | 0.106 |
| 2.0 | 0.088 |
| 2.5 | 0.074 |



Final Weightage

$a = 0.7$, $b = 1.0$, $c = 1.6$, $d = 1.2$



Conclusion