

Fig. 5. Multiple image selection process.

Firstly, we extract SIFT features [10] of all images. To increase the performance, we limit the number of SIFT features extracted from each image to 50. Each feature is assigned a value of $1/|F(I_i)|$ where $|F(I_i)|$ depicts the number of features in image i .

By accumulating all images, a dictionary of features is generated where each feature has a score according to the number of its occurrences among different images, i.e., if an image feature exist in many images it will have a higher score.

After determining the scores of each feature, these scores are used to calculate the score of images such that an image will obtain a score that is the sum of all its features' scores. This approach prioritizes visual elements that are shared frequently. Note that, in this approach, the shared images do not have to be identical to get prioritized but they need to include similar visual features, e.g., two images of the same scene

from different angles will both contribute to this scene's score.

At the end of this procedure, the image with the highest score can be selected as the representative image for that keyword. Nevertheless, it is possible for a keyword to have multiple representative images. In such a case, we need to avoid selecting images with little difference. To achieve that we used a mechanism as follows. When the highest score image is selected, scores of all similar images will be lowered according to their similarity level. Specifically, when an image is selected, scores of all its visual features in the dictionary becomes zero and image scores are updated. This procedure is shown in Figure 5.

IV. RESULTS AND DISCUSSION

The approach applied in this study shows two kinds of analysis results. Firstly the text analysis, which is presented in word clouds seen in Figure 3 which are created to show the

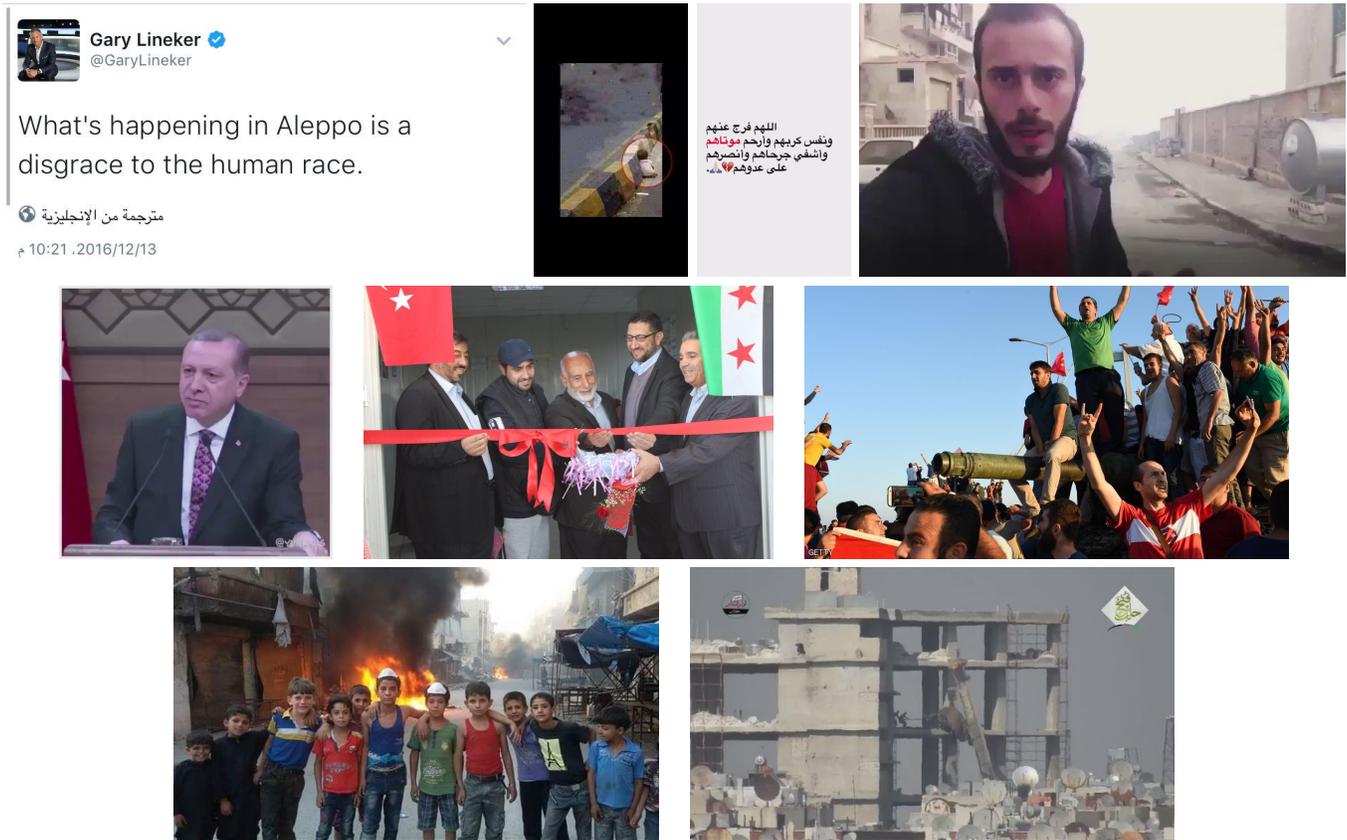


Fig. 6. Demonstration of visual analysis results for year 2016. Top row: images for Aleppo, middle: Turkiye, bottom: epic ('melhame' in Arabic). Number of chosen images for each word also represents the word's weight.