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Indistinguishable Modified Image Detector

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1. Indistinguishable Modified Image Examples

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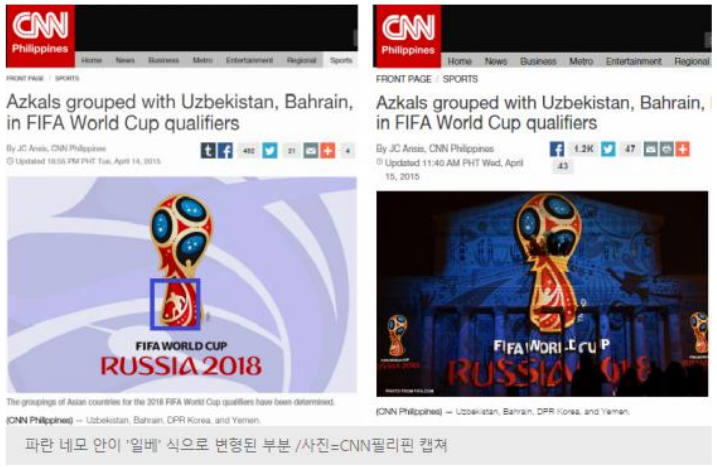

파란 네모 안이 '일베' 식으로 변형된 부분 /사진=CNN필리핀 캡쳐

미국 뉴스채널 CNN에도 일간베스트(일베)의 손길이 뻗쳤다.

14일(현지시간) 오후 6시55분 CNN필리핀 홈페이지에 올라온 기사 속에 포함된 2018 러시아 월드컵 로고가 일베 식으로 변형됐다. 15일 현재 일베식 이미지는 원본으로 바뀌어져 있으나 교체 전 이미지는 현재 일베를 비롯한 국내 온라인 커뮤니티를 중심으로 확산되고 있다.

변형된 로고에는 일베에서 고(故) 노무현 전 대통령을 조롱할 때 자주 쓰이는 이미지가 합성돼 있다. 한때 일베에서는 노 전 대통령을 잉글랜드 축구선수 스티븐 제라드에 빗대며 '무능력한데도 인기가 많다'는 식의 글이 사진과 함께 수차례 올라왔다.

CNN은 로고피디아에 올라온 일베식 이미지를 그대로 따오면서 이같은 혼란을 일으킨 것으로 전해졌다. 현재 로고피디아에는 일베식 로고 대신 원본 로고가 업데이트돼 있다.

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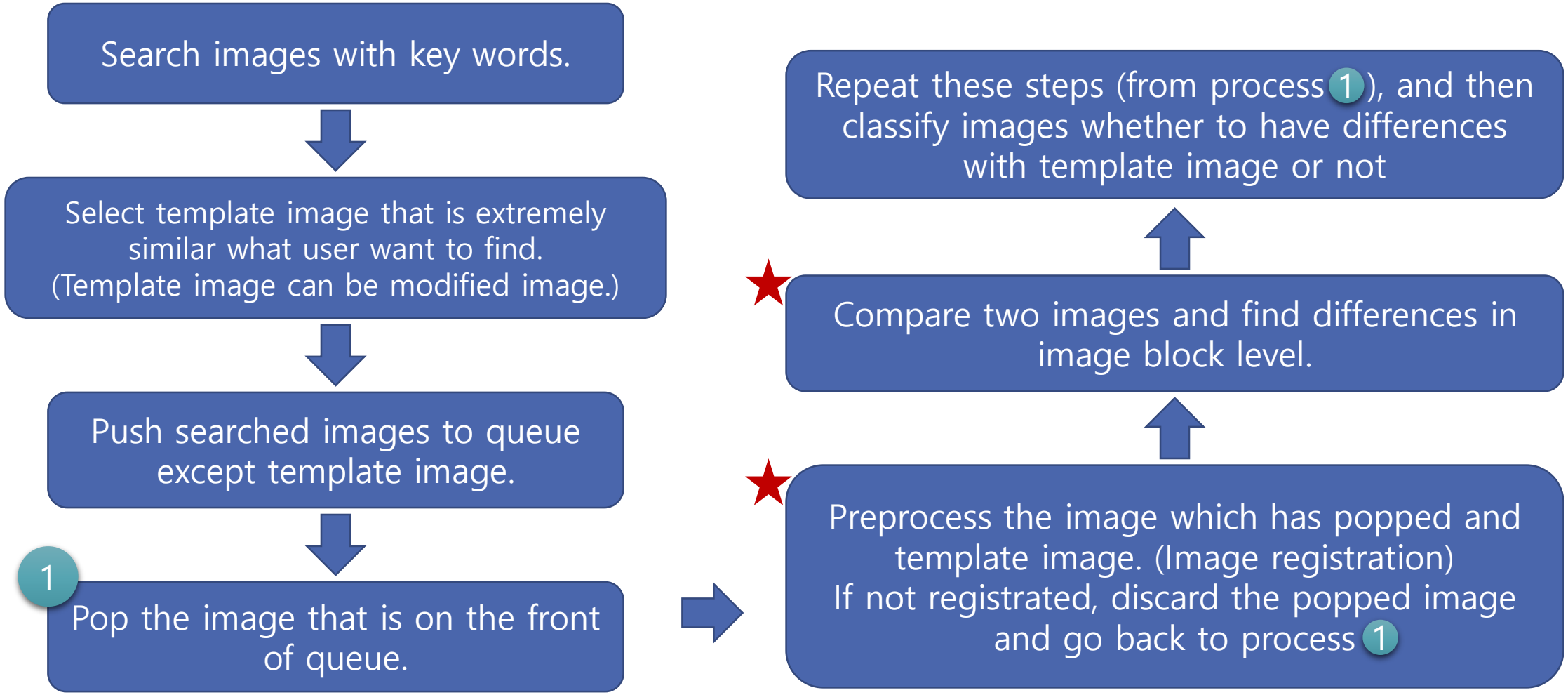
1. Problem

- These days, most people search image using Google search engine unsuspiciously.
- As shown images on previous slides, it is not easy for human eye to find tricky composition.
- In experiments, even though I told subjects that there are some changes at given images, they could not recognize the difference.
- As a solution for this problem, I suggest an algorithm that **analyses searched images and divides into original images group and the others which are modified.**

2. Algorithm

- Select Template Image
- Preprocessing
- Comparision

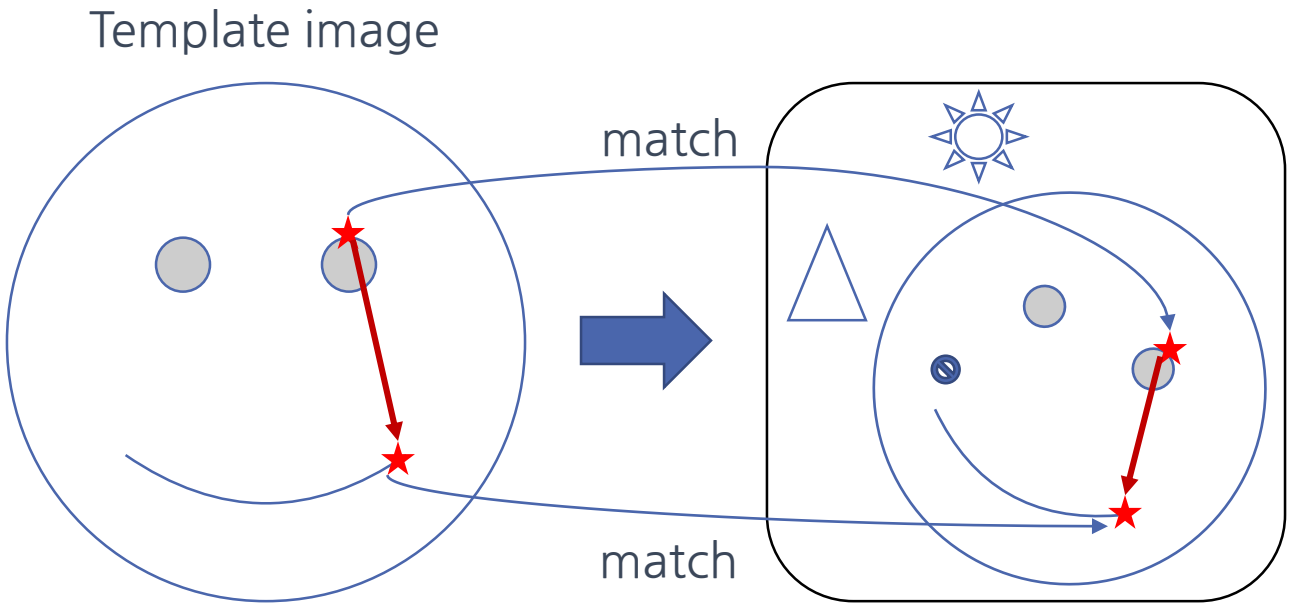
2. Algorithm


Search images with key words.
Select template image that is extremely similar what user want to find. (Template image can be modified image.)
Push searched images to queue except template image.
1
Pop the image that is on the front of queue.
Preprocess the image which has popped and template image. (Image registration) If not registrated, discard the popped image and go back to process 1
Compare two images and find differences in image block level.
Repeat these steps (from process 1), and then classify images whether to have differences with template image or not

2. Algorithm

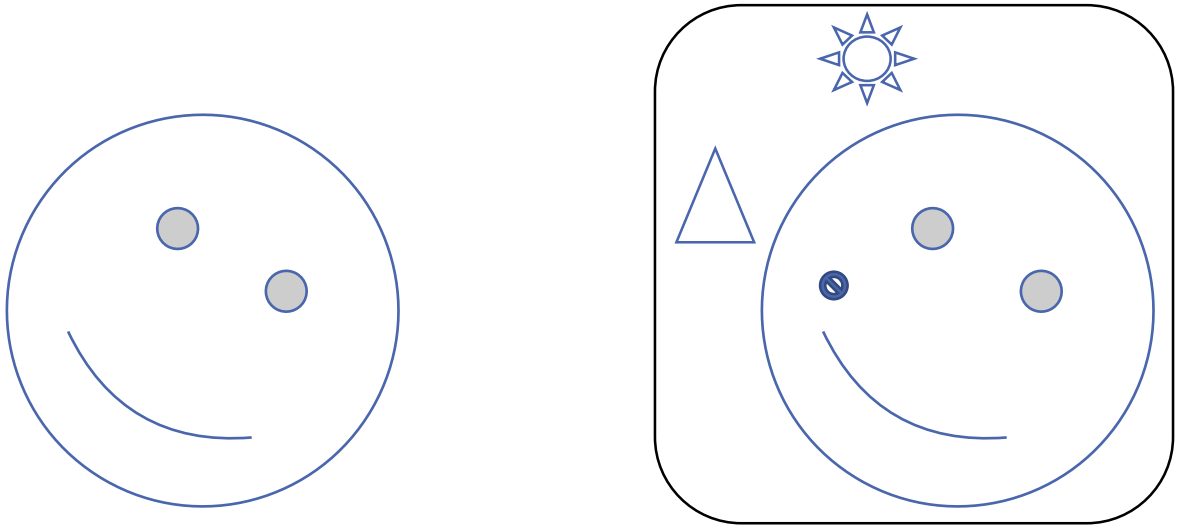
- Preprocessing
  - Image registration (between two images)
    - Resize Images.
      - Case ‘Big image’: for improving registration speed
      - Case ‘Small image’: for improving registration accuracy
    - Extract key points and descriptor in target images (using SURF algorithm).
    - Find good matches (key points match) between two images (using FLANN Matcher).
    - If sufficient matches not found, skip current image and go to next.
    - Extract each sample which has two matches.
    - Calculate rotational, translational and scale correlation between two images using extracted samples.
    - According to these correlations, registrate two images.

2. Algorithm



Calculate rotational, translational and scale correlation between two images using these two vectors.

2. Algorithm

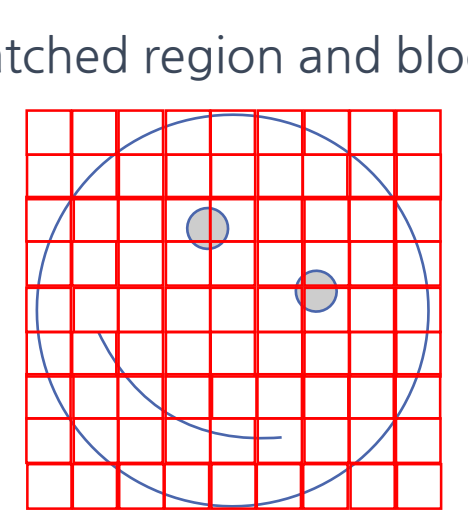


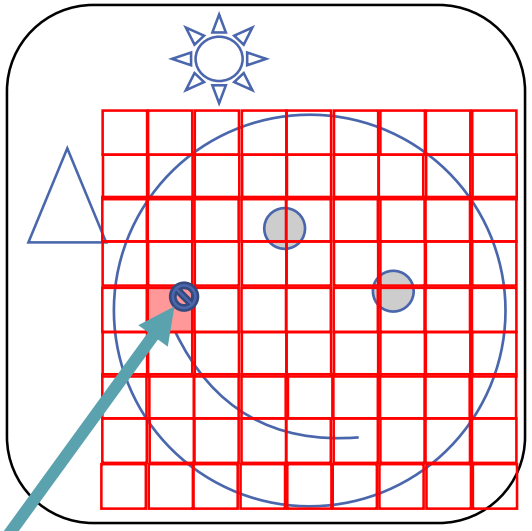
Registration result

2. Algorithm

- Comparison
  - Block level search and comparision

Matched region and blocks





Detected

3. Future Works

- So far, the algorithm shows unsatisfied result.
- More precise registration
- Improved comparision method
- Adoption of Google image search API for general use.

4. Conclusion

- This project is application of various image processing and computer vision methods.
- Computer is suitable for solving given issues than human.
- This solution will prevent some unexpected mistakes that I have shown in previous slides.