

Hotel Recognition to Combat Human Trafficking

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Introduction

Computer vision is an innovative and potent approach to combat human trafficking, as there are an increasing number of images of victims in hotel rooms available online among advertisements or criminal networks.

Hotel recognition is a challenging task because hotel rooms often share similar amenities and images are often of **low quality** and partially **occluded** by humans or objects. It requires a fine-grained classification model that handles a large number of classes and high intraclass and low interclass variation.

We built a CNN-based hotel recognition system and heavily applied data augmentation techniques to tackle these issues and mitigate the limited data availability.

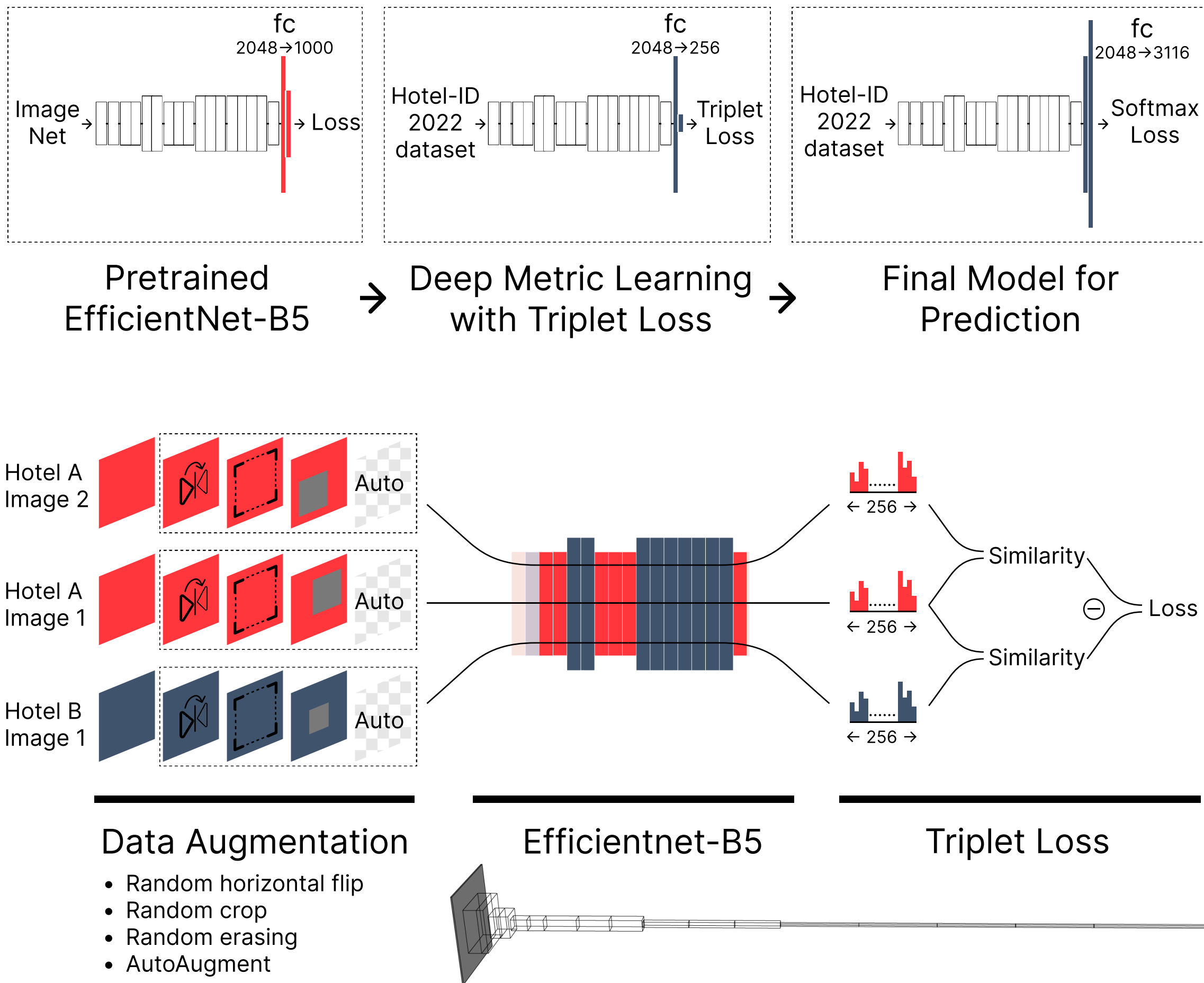
Hotel-ID 2022 Dataset

We conducted experiments on the dataset provided by the 2022 Hotel-ID to Combat Human Trafficking Competition.

It contains **49703** images from **3116** hotels. Random masks are applied to the test split.



Methods



Conclusions & Future Work

We proposed a system that classifies hotel room images to combat human trafficking. Beyond human trafficking, we envision that our project will have a broader impact on stopping more hotel-based crimes such as secretly installed pinhole cameras in hotel rooms. In the future, we would like to collect more real data and improve our model.

Problem statement

The objective is to recognize the hotels in which given images are taken.

Input → variable-sized RGB images

Output → hotel ID ranking

Evaluation metric →

$$\text{MAP@5} = \frac{1}{U} \sum_{u=1}^U \frac{1}{R(u)} I[R(u) \leq 5]$$

Experiments & Analysis

Backbones and resolutions

model	resolution	MAP@5↑
ResNet-152	224	0.229
ConvNeXt-L	224	0.226
ConvNeXt-L	384	0.273
EfficientNet-B4	224	0.331
EfficientNet-B5	224	0.332
EfficientNet-B4	380	0.359
EfficientNet-B5	456	0.368

Data augmentation methods

augmentation	MAP@5↑
No Augmentation	0.100
Random Erasing	0.437
RandAugment	0.455
AutoAugment	0.461
TrivialAugmentWide	0.466

Classification & Metric learning

training	inference	MAP@5↑
classif.	classif.	0.466
metric	metric	0.179
metric + classif.	classif.	0.473

Visualization

