

SensifAI: Smart-enhancing videos and images on-device while fully preserving privacy

Summary

There are many different image enhancement apps (e.g., Letsenhance.io and Google DeepAngel) that improve the quality of images or edit them automatically through advanced artificial intelligence. These apps require users to send their images to their cloud to process them. This increases the risk of getting hacked, exposed, or abused and potentially violates the privacy of millions of users. This is all because these apps work based on deep-learning that is computationally heavy and requires strong GPU servers.

SensifAI offers a game-changing technology that solves this problem. We have developed specific deep learning architectures for the new NPU chipsets of most major smartphone manufacturers. With this technology, we can enhance users' images and videos locally on their mobile phone without any connection to the internet.

In this project, SensifAI delivered an on-device, smart-enhance app that can help millions of people enhance their video/image archives while guaranteeing control over their personal data. We will also add automatic and real-time face and vehicle license plate detection/blurring systems in future versions of the app such that users can avoid unwanted violation of other people's privacy in public areas while live broadcasting or sharing images/videos on the internet.

Currently, SensifAI forged a partnership with worlds top semiconductor companies (Intel, NVIDIA and Huawei) that supply processors and AI chipsets to smartphone manufacturers and seized the opportunity of deploying deep-learning algorithms on NPUs for the first time in the world and publicly launched the world's first all on-device, deep neural and real-time video recognition application.

Keywords

Video Enhancement, Deep Learning, Edge Computing, Embedded Deep-Learning

Actors involved in the project

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The business

SensifAI develops cutting-edge deep learning technologies to recognize video and images automatically. SensifAI has launched the world's first embedded video recognition App for NPUs publicly and was a launch partner of Amazon Sagemaker platform and released the [world's first customizable video recognition platform](#).

SensifAI has gigantic customers such as Huawei, and Artus and world leading technology partners such as Amazon, NVIDIA, and Intel. The company has won several awards including EU top 50 company award, MIT technology review top 10 innovators in Belgium and IUIA innovation award. The company was founded by three alumni and scientists from MIT, ETHZ and KU Leuven, who previously co-founded over 10 successful start-ups. Having worked in the same research lab before SensifAI has helped the leadership team to develop a strong bond.

The problem

There are many images in our albums which are far from ideal due to bad lighting conditions, low resolutions of old cameras, or incorrect automatic setting of the camera. At the same time, there are different image enhancement apps (Letsenhance.io and Google DeepAngel) that improve the quality of images or edit them automatically through advanced artificial intelligence. These apps require users to send their images to their cloud to process them. This increases the risk of getting hacked, exposed, or abused and potentially violates the privacy of millions of users. This is all because these apps work based on deep learning that is computationally heavy and requires strong GPU servers.

The SensifAI solution and its results

SensifAI Image and Video Enhancement App automatically improves your low-quality images using an advanced artificial intelligence (AI) method based on deep neural networks. This app offers a fast and end2end approach to increase the lighting in dark pictures, improve contrast and brightness, shoot up the resolution, and adjust tones.

The software which is publicly available as an SDK as well as an Android App works in three modes: **automatic enhancement**, **superresolution**, and **manual improvement**. One can use one of these modes to enhance a specific picture according to a required correction and modification.

In **automatic enhancement** mode, the software applies a deep-learning model to automatically improve your image quality. For example, it increases the lighting of the images and improves the brightness without any effort from the users. Then it shows both images before and after the enhancement and lets the user compare them and save the enhanced image or remove it.

In **superresolution** mode, the program helps to increase the resolution of the images automatically using a deep-neural network system.

In **manual improvement** mode, the software provides a set of tools such that the users apply different filters manually to re-color or adjust the brightness of the picture. This mode is also accessible after an image was treated in superresolution or automatic enhancement modes.

SensifAI offers a game-changing technology that solves this problem. We have developed specific deep learning architectures for the smartphone chipsets of most major smartphone manufacturers. With this technology, we can enhance users’ images and videos locally on their smartphones without any connection to the internet. This is an on-device, smart-enhance App that can help millions of people enhance their video/image archives while guaranteeing control over their personal data.

The main advantages of SensifAI enhancement app are:

Guaranteeing User Privacy	Since SensifAI runs on the device, no personal data will be exposed to the cybersecurity risks of cloud-based platforms and users will have full control over their data.
Cutting the Costs of Cloud-Processing and High-Speed Internet Connection	Our app processes all the data locally on the user’s smartphone and thus cuts the (in)direct costs of cloud computing on expensive GPU-servers. This is because central computation over GPU-servers is very expensive and our app cuts the users’ costs for cloud computation.
No Need for High-Speed Internet Connection	Since the data is processed locally in the device, there is no need for an internet connection. While competitor apps require users to use the Internet to upload large video/image files to their cloud. This also reduces the costs for users.
Enhancing Videos as well as Images	This app does not only work for images, but it also makes videos searchable while the competitor apps only work for images.

The SensifAI app is a bold move beyond the state-of-the-art compared to current image enhancement apps which require uploading contents into the cloud thereby exposing users to cyber threats. SensifAI works locally on the device, which protects user’s privacy.

Besides, current image enhancement Apps only allow enhancement of images whereas SensifAI can also enhance videos.

Further extensions of SensifAI smart-enhance App also allows users to detect and blur peoples face or vehicles license plate in real-time. This feature helps users to be compliant with GDPR and avoid unwanted violation of other people’s privacy while recording video in public areas such as museums, live- broadcasting or sharing image/videos in social media.

Making videos and images enhanced is a global challenge in the modern multimedia era where we are capturing and saving more and more videos and images every day. Image enhancement apps already have more than 50,000,000 users throughout the world. Although it creates a huge market, the real wave of users is yet to come, and the potential of the market is untapped due to fears of privacy violation. People do not want their images and videos transmitted to the cloud of big players before encrypting them. SensifAI yields a new smart-gallery app that makes images and videos enhanced with it performs all the processes locally on the NPUs and assures users full data preservation.

Testimonial

During the several coaching sessions, mentors had very interesting suggestions to maximise the impact of the project. SensifAI adopted the suggestions and applied the following advancements beyond the originally submitted and accepted proposal.

- 1) We developed the app for Smartphones with NPUs from Qualcomm and Huawei initially. However, according to the mentor's suggestion, we have also developed the app for any normal android phone which even has no NPU. Although the app works with less speed on smartphones without NPU, this implementation increases the impact and visibility and usage of the app.
- 2) Mentors suggested to release a public SDK such that if any other developer in the world needed image or video enhancement, they can directly use SensifAI SDK. SensifAI released an open platform to attract the contribution of other developers to use the results of this project.

https://github.com/sensifai/Mobile_Image-Video_Enhancement

- 3) Mentors suggested adding a third mode beside superresolution and automatic enhancement such that users can manually use several tools and filters to modify their pictures. Therefore, we added the suggested filters to improve usability of the system and increase its impact.

Future plans

SensifAI plans to create a SuperApp offering many different image/video manipulation tools based on AI from different providers in one place and delivers it on both smartphones and PCs/laptops.

The planned App will include super-resolution, enhancement, cartoonizing, cut-out, summarization, background removal, face-conversion, avatarization, etc.