DAAD

Deutscher Akademischer Austauschdienst
German Academic Exchange Service
Section ST34 – Asia, Pacific

Approval Form by German Host (Head of the Department)

WISE – Working Internships in Science and Engineering

I would like to involve an Indian student in my research work for the following time period:

Internship period: 01.06.2022 – 05.08.2022

German Supervisor:

Name: Prof. Dr.-Ing. Jörn Ostermann
University/ Research Institution: Leibniz Universität Hannover
Address: Appelstr. 9A, 30167 Hannover
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Student Applicant:

Name: Anand Kumar
Address: 1/34, Adal Nagar, Villupuram, TN, India - 605401
Telephone: +91 89250 81166
Email: anandknitt@gmail.com

Subject/Specialization: **Computer Science / Machine Learning**

Title of the research project: Generative Video Coding using Neural Networks

Brief description of the research project (including notes on the experimental techniques used and possible tasks to be assigned to the research assistant):

State-of-the-art deep learning-based video codecs are based on autoencoders with quantization in the latent space and an additional hyper encoder that estimates and transmits the symbol distribution for more efficient entropy coding. They are typically trained using a rate-distortion cost function. Recently, perceptual cost functions gained a lot of interest, since they better match the human quality perception compared to traditional pixel-wise metrics such as PSNR. Unfortunately, learned perceptual cost functions introduce unwanted artefact to decompressed images and videos. For deep learning-based image compression, generative adversarial networks (GANs) have shown to suppress these compression artefacts.

Mr. Anand Kumar is tasked to re-implement an existing state-of-the-art deep learning-based video codec in Python using pyTorch as a baseline for his experiments. This baseline is then extended with a GAN and optimized with a perceptual loss function, e.g. MS-SSIM or LPIPS. For the evaluation, the performance of the extended codec is compared to the baseline at a fixed bitrate using PSNR and perceptual metrics such as LPIPS, NIQE, MS-SSIM, FID and KID.

Is practical experience necessary? ___Yes ~~X~~ No

Which other conditions does the applicant have to fulfill?

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What knowledge of German is mandatory for the research internship(s)?

~~X~~ good ___ fair ___ poor ~~X~~ none

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Institut für Informationsverarbeitung
Appelstr. 9A – 30167 Hannover

29.10.21

Date, stamp and signature of the German Host
(Head of the department)