Tokenized Image Synthesis With Regularized Vector Quantization

Master Thesis
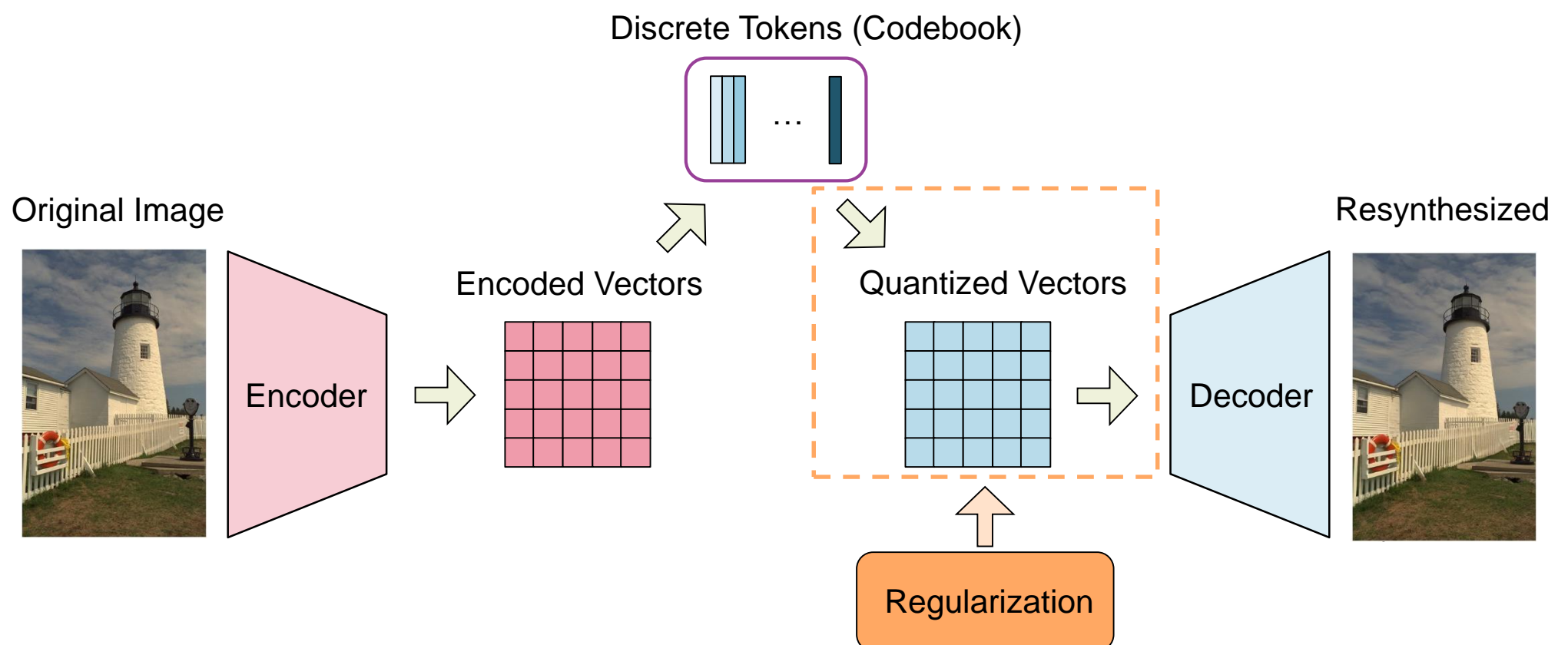
Image Synthesis	Data Compression	Vector Quantization	Deep Learning

With the increasing availability of camera products, the demand of storing and transmitting high resolution images efficiently has grown. The core of data compression lies in two aspects, namely, dimensionality reduction and quantization. Generative models have been proposed to compress the image and to provide a lossy version of the original one, while quantizing images into learned discrete representations has been a fundamental problem. Taking profit from image synthesis technique, models that learn to generate images with tokenized representations have been studied. In this work, we aim to improve the coding efficiency of the complete image compression system via regularization methods.

Discrete Tokens (Codebook)

Original Image → Encoder → Encoded Vectors → Quantized Vectors → Decoder → Resynthesized

Regularization

What is the thesis about?
- Establish the pipeline with existing methods (start with models with open-source code)
- Evaluate the performance and analyze the behavior with different regularization methods

Your skills
- Good programming skills, ideally Python
- First knowledge or practical experience in the field of machine learning is valuable
- Enthusiasm to solve problems
- Read and understand scientific texts in English

Our offer to you
- Insights into our current research
- Personal supervision and frequent discussion
- Invitations to the final presentation of other students to get an insight into the different research topics
- A workplace at our institute and the possibility to get in contact with other students
- Access to our own GPU cluster
- We aim to publish the results at a peer-reviewed conference

How to get in touch?
Just send me an e-mail (re.shi@tu-Braunschweig.de) with your field of study, your grades, and why you are interested in this topic.