

Exploring images with deep learning for classification, retrieval and synthesis

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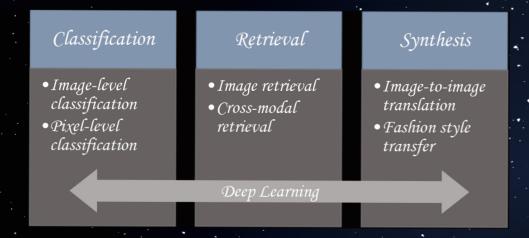
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In 2018, the number of mobile phone users will reach about 4.9 billion. Assuming an average of 5 photos taken per day using the built-in cameras would result in about 9 trillion photos annually. Thus, it becomes challenging to mine semantic information from such a huge amount of visual data. To solve this challenge, deep learning, an important sub-field in machine learning, has achieved impressive developments in recent years. Inspired by its success, this thesis aims to develop new approaches in deep learning to explore and analyze image data from three research themes: classification, retrieval and synthesis.

- (1) Classification aims to correctly predict semantic labels in an image, and acts as a fundamental task in computer vision. Typically, it can be divided to image-level and pixel-level classification.
- (2) Retrieval is to search for image candidates from the database that are similar to the query sample. This work studies not only image retrieval, but also cross-modal retrieval between images and texts.
- (3) Synthesis is able to generate new image samples that never existed in the image database. We mainly focus on two synthesis applications: image-to-image translation and fashion style transfer.



"Intelligence is the ability to adapt to change".

-- Stephen Hawking

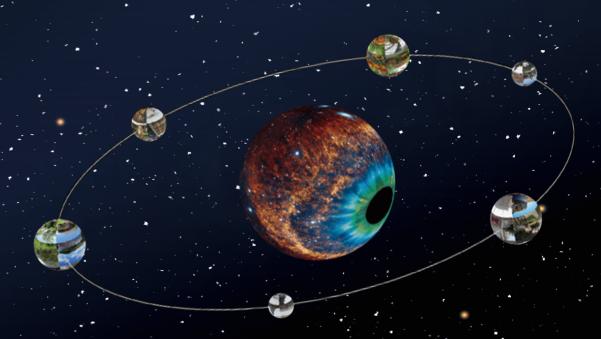
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