Snow Accumulation in Images using Machine Learning

TE2502: Civilingenjör Thesis Topic for Game Programming Students

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Brief Description:

Snow animation in computer graphics is a challenging topic. Snow accumulation, in particular, requires handling complex scene geometry, and computing accumulation on different objects in the scene based on their exposure to the falling snow. In many computer graphics applications where accuracy can be traded off for efficiency, such as games, this is an overkill of computation. With the help of Artificial Intelligence (AI), several steps can be automated or eliminated.

The goal of this project is to employ Machine Learning (ML) to compute realistic snow accumulation on objects in a provided image. To this end, learning would be first made through identified ML architectures on existing snow accumulation videos (time-varying). This together with other relevant information would be used to generate snow accumulation on objects in the given image. The student(s) will have a reasonable room to experiment and improve the project in the scientific and implementation areas.

Requirements:
- ✓ Student(s) should be advanced level programmers in C++.
- ✓ Courses on Artificial Intelligence, Machine Learning successfully completed.
- ✓ Knowledge in GPU programming desired.
- ✓ Interest and motivation in the underlying physics, simulation and the overall project.

References:

[1] Gatebe, Charles, et al. "Snow-covered area using machine learning techniques." *IGARSS 2018-2018 IEEE International Geoscience and Remote Sensing Symposium*. IEEE, 2018.
[2] Junede, Fredrik, and Samuel Asp. "Real-time 3D cloud animations using DCGAN." (2020).