Masaryk University
Faculty of Informatics

Maya2CellVIEW

Master's Thesis

David Kouřil

Brno, Fall 2016

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This is where a copy of the official signed thesis assignment and a copy of the Statement of an Author is located in the printed version of the document.

Declaration

Hereby I declare that this paper is my original authorial work, which I have worked out on my own. All sources, references, and literature used or excerpted during elaboration of this work are properly cited and listed in complete reference to the due source.

David Kouřil

Advisor: John Smith

Acknowledgement

This is the acknowledgement for my thesis, which can span multiple paragraphs.

Abstract

This is the abstract of my thesis, which can span multiple paragraphs.

Keywords

keyword1, keyword2, …

Contents

List of Tables

List of Figures

1 Introduction

1.1 Biological visualization and illustration

Here I should somehow present the field (but I don't know what field exactly - biological visualization, molecular visualization?)

1.2 Motivation

In this thesis we focused on providing better tools for scientific illustrators. The idea was to bridge software that they are used to (represented by Maya) and software that brings modern rendering abilities to the domain of molecular rendering (represented by CellVIEW). Emphasize the difference between offline and realtime rendering.

2 Overview of the two programs that I'm going to be bridging - TODO better title

Here I will talk about in which context are these two 'systems' used and what is each for. The point of this project was to make a bridge between two programs. In this chapter we will look at both of them, see what they bring to the table when used separately, what they lack and how can be benefit from connecting them in this way.

2.1 CellVIEW

Briefly describe what CellVIEW is about. Give links to the papers that are describing CellVIEW and those that are using it.

2.1.1 Unity

I don't know if this is needed. I could just go little bit into detail of why is Unity good (which is funny now that we are probably going away from it)

2.2 Maya

Point to examples of animations that are produced with Maya. Maya is a 3D content authoring software package developed by Autodesk. It has been introduced in 1998 and since than it has grown into de-facto industry standard in many fields that use computer graphics (most notably movies and computer games industry). Because of it's versatility, Maya has also been used for creating scientific illustrations. Although Maya is a very robust piece of software that gives it's users ability to create various types of 3D scenes, it isn't always the best tool for the job. There exist other software packages that might be more specialized and better suited for a task at hand.

2.2.1 Extensibility

Luckily, Maya comes with an enormously useful ability to be extended with so called plugins. Autodesk provides an API that programmers can use to extend Maya's functionality. Several plugins have been developed specifically for the field of molecular visualization and illustration. As an example, we can name Molecular Maya which brings users the ability to import molecular data from online Protein Data Bank. The plugin then allows the user to choose how this data should be represented in a 3D scene and Maya then takes care of rendering such structure.

3 Suggested solution

I have introduced the field. I have sketched the problem that we are trying to solve (improving the workflow of animators/illustrators). Now it's time to describe the suggested solution.

4 Implementation details

4.1 WinAPI

4.2 Maya side

Topics - Architecture of the plugin, what parts/classes of API are used, memory layout, what I tried and didn't work.

4.3 Unity side

Topics - Architecture of the plugin, very generally about plugins (it's just a basic C++ dll plugin), interface between C++ and C#

5 Future work

What optimizations I could implement, how it could be used and what would be needed to implemented for that.

A An appendix

Here you can insert the appendices of your thesis.