CREAL: A language for describing biological systems from a macro to a molecular scale

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ABSTRACT

A language that can describe biological systems from a macroscopic scale can play an important role in better understanding the mechanisms that drive aging process and development. This paper presents CREAL (Computer Representation of Extensible Animal), a language for describing biological systems. CREAL is a natural language that is flexible enough to describe complex biological systems. It is an attempt to describe a model that is based on the visual representations of biological processes. The language is designed to describe the interactions of objects and properties, as well as their effects on each other. The language can also be used to describe the interactions of objects and properties within a hierarchy. The language can be used to describe the interactions of objects and properties with each other, as well as the effects that the objects have on each other.

INTRODUCTION

The goal of this project is to create a computer language that can accurately and subsequently simulate the effects of aging in several organs, including the heart, the liver, and the kidney. We are taking a systematic approach to creating the effects of aging in different organs.

METHOD

The CREAL language is designed so that each entity of interest is assigned a role to describe its properties and functions. Each entity will either effect each other through sets of predefined actions based on the environment and conditions. Through these interactions, an overall path can be created by linking the objects to each other to view the biological interactions of a system. "Numerical" IDs are assigned in addition to the set of rules that allow us to make annotations. Furthermore, a number of properties associated with each entity can be used to further describe the object, as well as to describe the effects that the object has on its surroundings. The language can be used to describe the interactions of entities and properties with each other, as well as the effects that the objects have on each other.

RESULTS

Using the CREAL language, we created IDs 543 (GFR for African American Male) and 542 (GFR for Non-African American Male). Using these IDs, we can easily express the mathematical equations and models that govern the biological system. For example, we can use CREAL to determine precisely how this particular patient will age, and adjust their treatment or prescription accordingly.

DISCUSSION

The impact of a fully developed CREAL language is not limited to one group, rather, it is meant to be used as a tool for access to such medical, physiological, and biological processes. For example, by entering the appropriate data from a patient, a physician would use CREAL to determine how this particular patient will age, and adjust their treatment or prescription accordingly.

ACKNOWLEDGMENTS

We gratefully acknowledge the efforts of the following individuals: Paola S. Timiras, Prof. L.J.C. van Loon from Department of Human Movement Sciences of Maastricht University Medical Centre, and 17, 2012)

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Creatinine concentration vs. Age

Creatinine concentration vs. Age

This graph measures the change in glomerular filtration rate (GFR) in an African American male patient. GFR is also displayed.

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