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A Homotopy Method of Path Analysis for the Purpose of Computing

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A HOMOTOPY METHOD OF PATH ANALYSIS FOR THE PURPOSE OF COMPUTING

Introduction:

A path is the first class object in computing, and computing resources can be identified using path hierarchies. However, finding reasonable path representations becomes more challenging in higher dimensions. Encoding paths in higher dimensions leads to a proliferation of duplicate path elements and functions, as well as all associated propositions and assertions. Additionally, representing path hierarchies with many levels is difficult due to length limits for specifying paths. For these and other reasons, traditional path representations are limited to low dimensional paths.

The present disclosure provides systems and methods for path analysis using a homotopy method, for the purpose of computing. In particular, the present disclosure unifies path representations with the standard construction and formalizes synthetics and semantics of the paths. In this way, the present disclosure enables efficient representation and manipulation of paths in well forms of all dimensions. This is critical and significant to computing, for example, when path representations need to be transformed to each other during cloud resource and service migrations.

Summary:

The present disclosure provides for an original treatment to paths by homotopy-theoretic n-path generalization. This present disclosure sets up a foundation of paths and develops a notation to encode both synthetics and semantics of paths in all dimensions. The homotopy-theoretic n-path generalization is original such that it is grounded from the foundation, and develops both synthetic and semantic notations with tower construction procedures.

The present disclosure develops homotopy path analytics. In particular, the present disclosure develops the internal homotopy techniques for path constructions. This invention also develops the homotopy dimension as path measures.

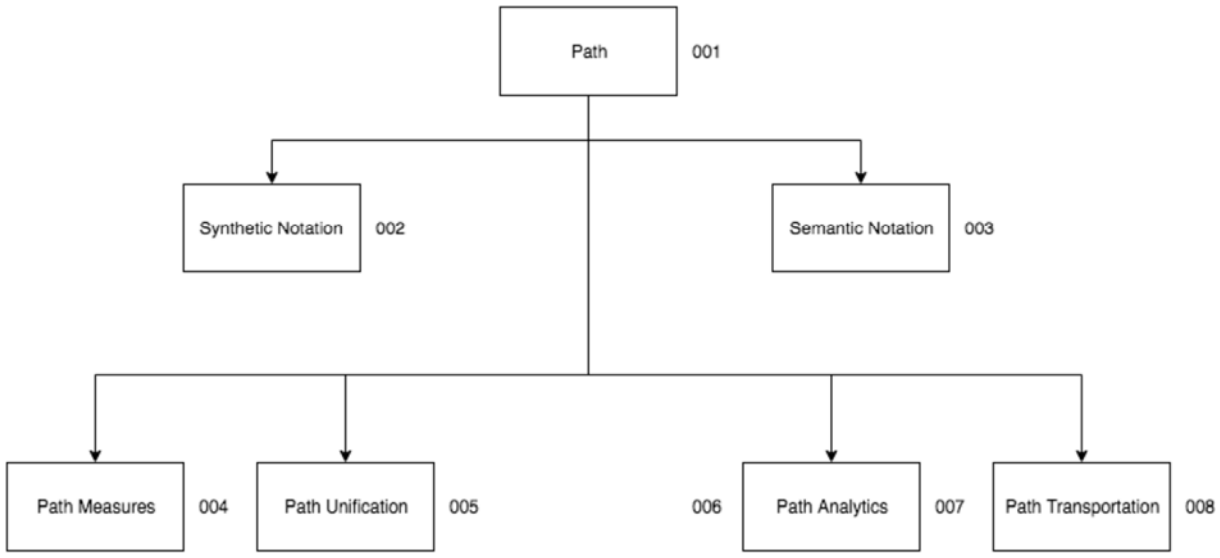
The present disclosure unifies path representations with the standard construction and formalizes synthetics of paths as univalence and a scheme of inductive types. The standardization derives a string notation for higher dimensional paths.

The present disclosure derives an algebra and a calculus tool for path constructions. The present disclosure develops the path algebra by constructing an appropriate normalization procedure to encode path synthetics by strings of Postnikov towers by a finite W-type with labels of words. The present disclosure also develops a calculus tool to encode path semantics with Postnikov tower constructions.

The present disclosure enables the representation of paths in all dimensions, and shows that classical geometric properties are encoded by the paths. In this way, the present disclosure can eliminate path duplication in higher dimension path representations, and allow for representation of large collections of hierarchies.

The attached appendix provides further detail of the present disclosure, and examples that encode higher dimensional paths encompassing multiple compositions with the synthetic and semantic notations of the present disclosure.

Drawings:



A Homotopy Path Notation

Appendix:

The present disclosure provides systems and methods for path analysis using a homotopy method, for the purpose of computing. In particular, the present disclosure unifies path representations with the standard construction and formalizes synthetics and semantics of the paths. In this way, the present disclosure enables efficient representation and manipulation of paths in well forms of all dimensions, including in higher dimensions. This is critical and significant to computing, for example, when path representations need to be transformed to each other during cloud resource and service migrations. Keywords associated with the present disclosure include: path analysis; homotopy; homotopy path analytics; path constructions; path geometry; path representation; higher dimensions; cloud resource; service migration; cloud computing; big data.