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Computer Science

**School of**

**MS.c. Seminar**

**Thursday August 31, 2017 at 9:30 AM Location: JD MacLachlan Room 228**

Spherical Point Distributions for Relative Position Descriptors of 3D Vector Objects

**Jason Kemp**

**Advisor:** Dr. Pascal Matsakis

**Advisory Committee Member:** Dr. Dave Calvert

**ABSTRACT:**

A relative position descriptor (RPD) is a quantitative representation of the position of a spatial object relative to another. A set of directions evenly distributed in the 3D space — or, equivalently, a set of points evenly distributed over the unit sphere — is required to compute the RPD of a pair of 3D objects. Many spherical point distributions exist that could work for this purpose. Here, we examine a new distribution designed to decrease RPD computation times in the case of 3D vector objects, and we compare this new distribution against other common distributions.

**MS.c. Seminar**

**Thursday August 31, 2017 at 10:00 AM Location: JD MacLachlan Room 228**

Force Histogram Computation in the Case of Raster Data

**Jaspinder Kaur**

**Advisor:** Dr. Pascal Matsakis

**Advisory Committee Member:** Dr. Andrew Hamilton-Wright

**ABSTRACT:**

The force histogram is a quantitative representation of the position of a spatial object relative to another, and it has been used in many applications. Various approaches for its computation in the case of raster data can be found in the literature. The two main approaches are discussed here: the classical approach usually works well with 2D data but is inefficient in the case of 3D data; the FFT-based approach is less efficient in the case of 2D data, and it has not been implemented but is expected to be much more efficient in the case of 3D data.

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Generating Linguistic Relative Position Descriptions from the PHI-Descriptor

**Jesse Francis**

**Advisor:** Dr. Pascal Matsakis

**Advisory Committee Member:** Dr. Fei Song

**ABSTRACT:**

In daily life, knowledge about the relative position of objects in space is conveyed through linguistic expressions, using terms that denote spatial relationships, like “is far from”, “is above”, “overlaps”, “surrounds”. Relative position descriptors (RPDs) are quantitative representations of the position of a spatial object relative to another, and they can be used to derive models of spatial relationships. Here, we focus on the PHI-descriptor — a new RPD that captures way more spatial relationship information than its competitors — and we present a fuzzy system that uses the PHI-descriptor to produce linguistic descriptions of relative positions.

**MS.c. Seminar**

**Thursday August 31, 2017 at 11:00 AM Location: JD MacLachlan Room 228**

Normalization Methods for the Force Histogram

**Manal Jazouli**

**Advisor:** Dr. Pascal Matsakis

**Advisory Committee Member:** Dr. David Chiu

**ABSTRACT:**

A relative position descriptor (RPD) is a quantitative representation of the position of a spatial object relative to another. RPDs have been used in applications such as scene matching, human-robot interaction, and geospatial information retrieval. RPDs are usually not invariant under similarity transformations (i.e., the RPD changes when a similarity transformation is applied to the objects). However, some RPDs can be normalized and made invariant under these transformations — and this is a desirable property. Here, we review and introduce new normalization methods for a well-known RPD, namely, the force histogram.