

# Measuring the Similarity and Relatedness of Concepts in the Medical Domain : IHI 2012 Tutorial Overview

Ted Pedersen  
Dept. of Computer Science  
University of Minnesota  
Duluth, MN 55812 USA  
tpederse@d.umn.edu

Bridget McInnes  
College of Pharmacy  
University of Minnesota  
Minneapolis, MN 55455 USA  
bthomson@umn.edu

Serguei Pakhomov  
College of Pharmacy  
University of Minnesota  
Minneapolis, MN 55455 USA  
pakh0002@umn.edu

Ying Liu  
College of Pharmacy  
University of Minnesota  
Minneapolis, MN 55455 USA  
liux0395@umn.edu

## ABSTRACT

The ability to quantify the degree to which concepts are similar or related to each other is a key component in many Natural Language Processing (NLP) and Artificial Intelligence (AI) applications. For example, in a document search application, it can be very useful to identify text snippets that contain terms that are similar to (but not identical) to those provided by a user. This tutorial will introduce the theory behind measures of semantic similarity and relatedness, and show how these can be applied in the medical domain by using freely-available open-source software<sup>1</sup> (UMLS::Similarity). This software takes advantage of the Unified Medical Language System<sup>2</sup> (UMLS), which is maintained by the National Library of Medicine (USA). The tutorial will also show how to evaluate existing measures with manually-created reference standards.

## Categories and Subject Descriptors

I.2 [Artificial Intelligence]: Natural Language Processing;  
J.3 [Life and Medical Sciences]: Medical Information Systems

## General Terms

Experimentation, Algorithms

## 1. TUTORIAL TOPICS

This two hour tutorial is divided into three main areas, where examples from the medical domain will be used throughout to illustrate key ideas.

### • Semantic Similarity and Relatedness (30 minutes)

Dr. Pedersen will conduct a theoretical overview of semantic similarity and relatedness. He will discuss some of the most commonly used measures and explain the distinctions between them.

<sup>1</sup><http://umls-similarity.sourceforge.net>

<sup>2</sup><http://www.nlm.nih.gov/research/umls/>

### • Using UMLS::Similarity (60 minutes)

Dr. McInnes and Dr. Liu will introduce the Unified Medical Language System and UMLS::Similarity [1], a freely-available open-source software package that computes measures of similarity and relatedness.

### • Getting Started (30 minutes)

Dr. Pakhomov will present a methodology for evaluating measures of similarity and relatedness using manually-created reference standards, and using the measures for clinical applications.

## 2. INTENDED AUDIENCE AND AIMS

This tutorial is designed for Health Informatics professionals with an interest in ontologies or Natural Language Processing. Those who attend will learn how to:

- understand the distinction between semantic relatedness and semantic similarity,
- measure semantic similarity and relatedness using information from ontologies, definitions, and corpora,
- access these measures from the UMLS::Similarity command line, API, and web services,
- integrate these measures into NLP / AI applications, and
- conduct experiments using freely-available manually-created reference standards.

## 3. ACKNOWLEDGMENTS

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## 4. REFERENCES

- [1] B. McInnes, T. Pedersen, and S. Pakhomov. UMLS-Interface and UMLS-Similarity : Open source software for measuring paths and semantic similarity. In *Proceedings of the Annual Symposium of the American Medical Informatics Association*, pages 431–435, San Francisco, 2009.