

FACULDADE DE ENGENHARIA DA UNIVERSIDADE DO PORTO

Information and Data Analysis System for Gene Expression

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TECHNICAL REPORT



Mestrado Integrado em Engenharia Informática e Computação

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Abstract

Resumo

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Abbreviations

cDNA	Complementary DNA
DNA	Deoxyribonucleic Acid
FEUP	Faculty of Engineering of the University of Porto(<i>Faculdade de Engenharia da Universidade do Porto</i>)
IBMC	Institute for Molecular and Cell Biology (<i>Instituto de Biologia Molecular e Celular</i>)
mRNA	Messenger RNA
RNA	Ribonucleic Acid
RNA-Seq	RNA Sequencing
tRNA	Transfer RNA
WTSS	Whole Transcriptome Shotgun Sequencing

Chapter 1

Introduction

1.1 Context and Motivation

1.2 Objectives

1.3 Document Outline

Besides the introduction chapter, this document is composed three additional chapters. These chapters have the following structure:

Chapter 2 introduces some basic Biology and RNA Sequencing concepts, that are essential to understand the problems with which this document deals. Furthermore, we describe the main techniques used for genome/transcriptome sequencing and assembly, their differences and applications and the tools and data formats typically used on those areas. Lastly, we give some insight about machine learning algorithms and how they will be applied to this work.

Chapter 3 presents the datasets that will be studied and used in this work, their origins and features. We will also refer the validation methods that will be used to access the quality of our results.

Chapter 4 outlines the main steps in the development of this thesis (and the respective software prototype). In the last part of this chapter we will attempt to provide a feasible schedule for this work's execution.

Introduction

Chapter 2

Background

2.1 Introduction

2.2 Genome Assembly and RNA Sequencing

2.2.1 Assembly Methods

2.2.2 RNA Sequencing Tools

2.2.3 Common Data Formats

2.3 Machine Learning

Background

Chapter 3

Datasets and Validation

3.1 Datasets

3.2 Result Validation

Datasets and Validation

Chapter 4

Work Plan

4.1 Development Phases

4.2 Schedule Planning

Work Plan

References