

A Machine Learning Perspective on Predictive Coding with PAQ

Presentation by Phil Trommer

November 6, 2019

Overview

- 1 Introduction to PAQ
- 2 PAQ8
 - Architecture
 - Model Mixer
 - Mixture of Experts
 - Updating & Filtering
- 3 Applications for PAQ8
- 4 References

Introduction to PAQ

- 1 Introduction to PAQ
- 2 PAQ8
- 3 Applications for PAQ8
- 4 References

Introduction to PAQ

What is PAQ8

- What is it?
- How does it work?
- What makes it so famous?

Introduction to PAQ

Matt Mahoney

- Born 1955
- Recieved Ph.D in computer science at Florida Tech in 2003
- Released PAQ1 on January 6, 2002



Introduction to PAQ

Matt Mahoney

- Born 1955
- Recieved Ph.D in computer science at Florida Tech in 2003
- Released PAQ1 on January 6, 2002



What is PAQ?

- A lossless, open-source compression algorithm
- Brings high performance at the cost of increased memory usage and time consumption
- Related to PPM, is envisioned as PPMs improvement

Principles of PAQ

- Modeling combined with adaptive arithmetic encoding
- Open to additions and improvements
- Improves performance of PPM by including several predictors (i.e. models of data)
- Combines the result of the predictors

Exemplary Predictors

The order- n context predictor

- Examines the last n bits and counts the 1's and 0's
- Estimates probability whether next bit is 1 or 0 like PPM

Exemplary Predictors

The order- n context predictor

- Examines the last n bits and counts the 1's and 0's
- Estimates probability whether next bit is 1 or 0 like PPM

The sparse context predictor

- Context consists of a specific amount of non-contiguous bytes before the current bit

Introduction to PAQ

Exemplary Predictors

The order- n context predictor

- Examines the last n bits and counts the 1's and 0's
- Estimates probability whether next bit is 1 or 0 like PPM

The sparse context predictor

- Context consists of a specific amount of non-contiguous bytes before the current bit

PAQ & Predictors

- Predictors in PAQ are used simultaneously
- Result with the most usability is chosen

Introduction to PAQ

- 1 Introduction to PAQ
- 2 PAQ8
 - Architecture
 - Model Mixer
 - Mixture of Experts
 - Updating & Filtering
- 3 Applications for PAQ8
- 4 References

Applications for PAQ8

- 1 Introduction to PAQ
- 2 PAQ8
- 3 Applications for PAQ8**
- 4 References

- 1 Introduction to PAQ
- 2 PAQ8
- 3 Applications for PAQ8
- 4 References