Computational Intelligence Methods

Jaroslav Langer *

Říjen 2020

Contents

*notes form lectures MIE-MVI/FIT/CTU

Abstract

Definitions, terms and knowledge from course NI-MVI. Course page.

1 Lecture 1. Introduction

What is intelligence

Evolutionary

Genotype fenotype

- fitness function

Significant fields

- self-driving cars
- intelligent assistents
- general artifical inteligence (play game from visual input)

Research at Datalab

prg.ai

ethics

2 Lecture 2. Machine Learning

History

- 1940
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- 2010

  GAN

  Transformers (pros of conv + recu)
- 2020+

  AutoML in RL

Machine learning tasks

- regression / prediction
- classification / recomendation
- clustering /
- problem solving / planing / control

2.1 Types learning

- supervised
- unsupervised
- semisupervised
- Active learning
- transfer learning
- few-shot learning
- meta-learning / continual learning

Examples by types

Measuring the performace

Learning systems

Defining learning task

- T - task ()
- P - performance
- E - expirience

Design learning system

- database, prepare data
- choose what to be learnt - target function
- choose representation of target function
- choose learning algoritm
- supply algorithm with performance metric

Checkers example

Building the database

- Direct expirience

  set of board with correct move

- indirect expirience

  sequences of game moves and final results

Choose target funciton

- choseMove(board, legalMoves) -¿ bestMove
- V(board) -¿ R (how favorible position) - can be applied for all legalMoves

Choose target funciton representation

Machine learning methods

Ants AI challenge

3 Lecture 3. Evolutionary Algos

4 Lecture 4. Neural Networks

Overview

- Introduction to artificial neural networks
- Perceptron, gradient learning
- MLP, Back-propagation of error
- Unsupervized training - SOM