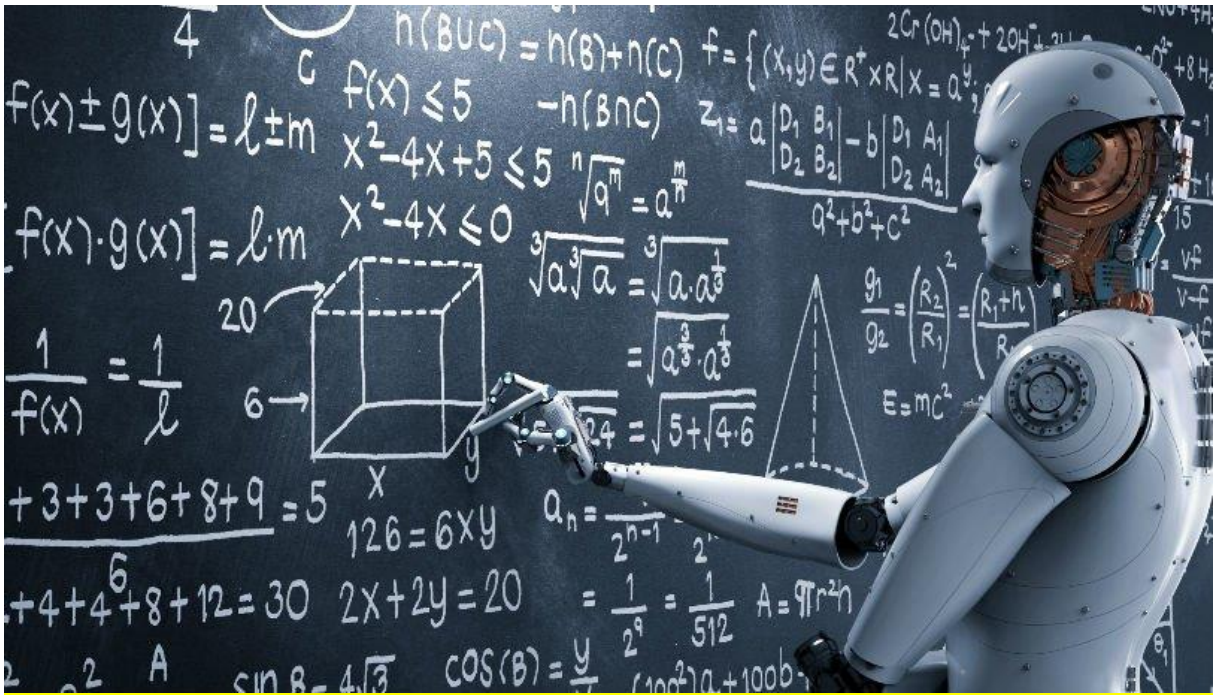
Artificial Intelligence

Machine Learning

Deep Learning

Using JavaScript



Loading, Processing, Learning and Visualization

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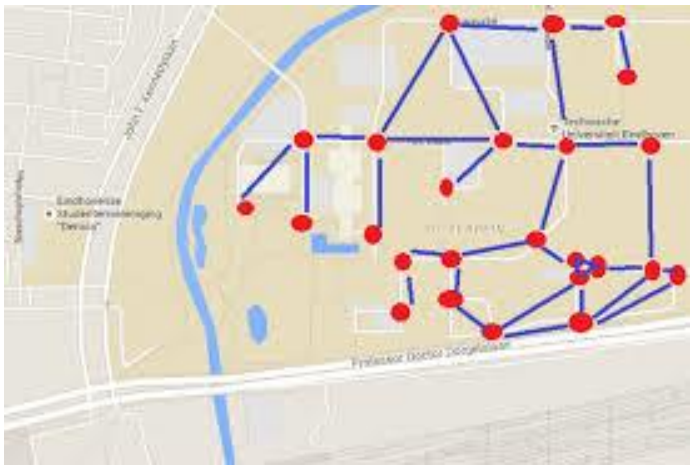
Introduction

- JavaScript Overview
- JavaScript for Data Science
- Loading and Processing Data
- Asynchronous Processing
- Random Variables and Probability
- Data Visualization
- Working with Vector and Matrix

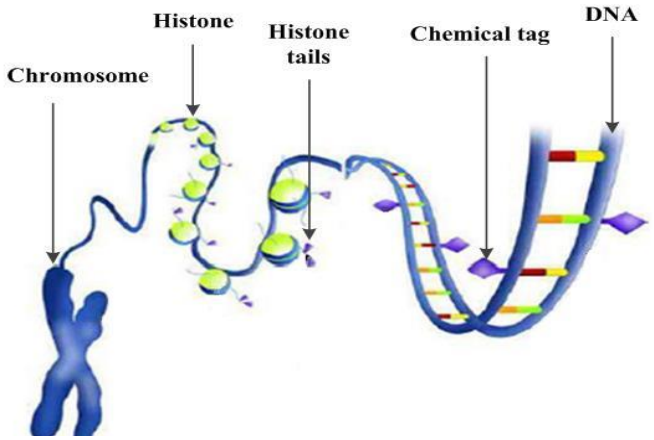
Implementing Graph Search Algorithms



- Trees and Graphs
- Shortest Path Problems
- Directed and Undirected Graphical Models
- Coordinate Graphing
- Graph Traversal Algorithms
- Breadth First Search
- Depth First Search
- Greedy Best First Search
- A* Search
- Weighted Graph Algorithms
- Dijkstra's
- Weighted A*
- Application in Geographical Maps

Implementing Genetic Algorithms

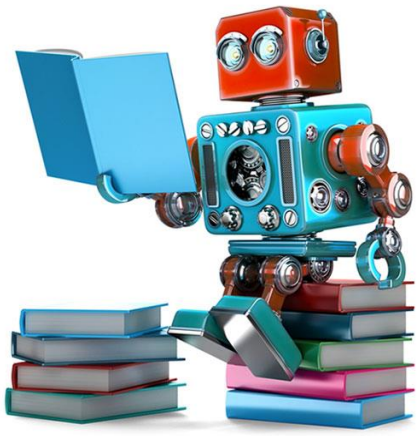
- Biological Background
- Genetic Programming
- Initial Population
- Encoding DNA Sequences
- Genotype and Phenotype
- Fitness Function
- Principles of Natural Selection
- Crossover and Mutation
- Evolutionary Systems
- Genetic Algorithms for Solving Hard Problems
- Genetic Algorithms in Search Engine
- Genetic Algorithms for Games and Reinforcement Learning



Machine Learning Algorithms

Supervised Learning

- Regression
  - Linear Regression
  - Logistic Regression
- Classification
  - Decision Trees
  - K-nearest neighbors
  - Naive Bayes



Unsupervised Learning

- Cluster Analysis and Segmentation
- Clustering
  - K-Means Clustering
  - k-NN Clustering
  - Hierarchical Clustering
- Dimensionality Reduction

Semi-supervised Learning

Reinforcement Learning

Active Learning

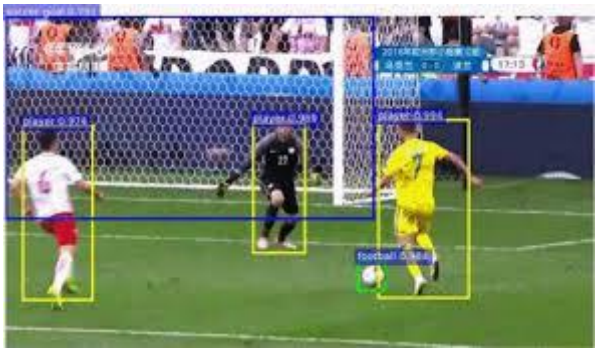
Deep Neural Network

- Biological Inspiration
- Loading and Preparing Dataset
- Single Layer Perceptron
- Multilayer Neural Network
- Weight Initialization
- Activation Functions (Sigmoid, Tanh, Softmax, ReLU, Leaky ReLU)
- FeedForward Algorithm
- Learning Rate and Bias
- Training Network
- Cost/Loss functions and Optimization
- Backpropagation using Gradient Descent Algorithm

- Under-fitting and Overfitting
- Dropout and L1, L2 Regularization
- Computer Vision Approaches
- Convolution Neural Network
- Reinforcement Learning and Neuroevolution
- Neural Networks in Medical Diagnosis

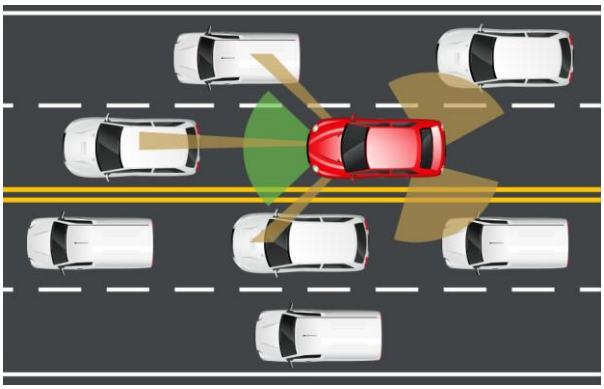
Image/Video Processing

- Color Models and Transformations
- Contrast and Brightness
- Painting with Pixels
- Pixelation
- Geometric Image Transformations
- Compression and Filtering
- Digital Morphology
- Image Restoration
- Image Similarity Measures
- Image Segmentation
- Edge Detection Techniques
- Optical Character Recognition
- Face Detection
- Object Detection and Localization
- Motion detection
- Real-time Object Detection and Tracking



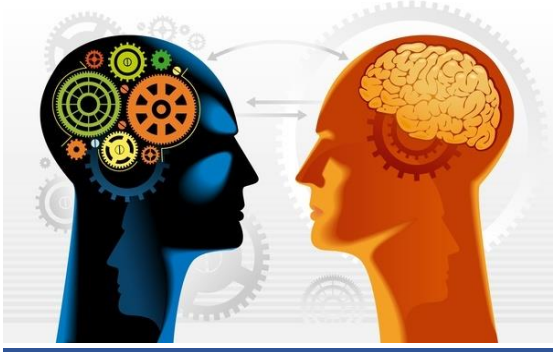
Steering Behaviors for Autonomous Characters

- Particle Systems
- Position, Velocity and Acceleration
- Social Behaviors
- Calculating Forces
- Adding Forces
- Displacement Force
- Obstacle Avoidance
- Seek and Flee Behavior
- Arrival Behavior
- Wander Behavior
- Flocking Behaviors
- Collision Avoidance Behavior
- Leader Following Behavior
- Building Autonomous Agent
- Physic Engine and Game



Text Mining and Natural Language Processing

- Human Communication
- Character Encoding
- Advanced Regex
- Data Structure and Algorithms
- Natural Language Understanding
- Natural Language Generation
- Text Manipulation
- Probabilistic Language Models



- Morpho-Syntactic Analysis
- Document Classification
- Syntactic Analysis (Grammatical)
- Semantic Analysis (Mining)
- Pragmatics and discourse analysis
- Opinion Mining and Sentiment Analysis
- Speech Processing
- Question-Answering System