Timeline

Description automatically generated**Historical Development of AI**

|  |  |
| --- | --- |
|  | |
| Ancient AI history (before 1950s) |  |
| Nascent AI (1956–1974) |  |
| First AI Winter (1974–1980) |  |
| Knowledge representation (1980–1987) |  |
| Second AI Winter (1987–1993) |  |
| Learning from data (since 1993) |  |

Text

Description automatically generated with medium confidence**Aristotle, Greek Philosopher (382–322 BCE)**

Diagram

Description automatically generated**Important Aspects of AI**

|  |  |
| --- | --- |
| Computational power |  |
| Mature algorithms |  |
| Availability of data |  |
| AI |  |

**Components of an Expert System**

Diagram

Description automatically generated

|  |  |
| --- | --- |
| Non-expert |  |
| User interface |  |
| Inference engine |  |
| Knowledge base |  |
| Expert system |  |
| Expert knowledge |  |

**The Gartner Hype Cycle** Diagram

Description automatically generated

|  |  |
| --- | --- |
| Expectations |  |
| Time |  |
| Innovation trigger |  |
| Peak of inflated expectations |  |
| Trough of disillusionment |  |
| Slope of enlightenment |  |
| Plateau of productivity |  |

Diagram

Description automatically generated**Application Areas of AI**

|  |  |
| --- | --- |
| AI application areas |  |
| High tech & telecommunication |  |
| Automotive & assembly |  |
| Healthcare & pharma |  |
| Consumer goods & retail |  |
| Business, legal, and professional services |  |
| Financial services |  |

**The Confusion Matrix**

Table

Description automatically generated

|  |  |
| --- | --- |
| Predicted result |  |
| Actual result |  |
| True |  |
| False |  |

**Initial Situation in the Labyrinth**

A picture containing chart

Description automatically generated

**The Process of Reinforcement LearningDiagram

Description automatically generated**

|  |  |
| --- | --- |
| Agent |  |
| Environment |  |
| State |  |
| Reward |  |
| Action |  |

A screenshot of a computer

Description automatically generated with medium confidence**Transitions in the Labyrinth**

**Example for Named Entity Recognition**

Graphical user interface, application

Description automatically generated

|  |  |
| --- | --- |
|  | |
| On Monday afternoon I will meet Paul at the library |  |
| Date |  |
| Time |  |
| Person |  |
| Location |  |

**Text-to-Text Translation as a Part of Speech-to-Speech Translation**

Diagram

Description automatically generated

|  |  |
| --- | --- |
| English speech |  |
| Automatic speech recognition |  |
| English text |  |
| Machine translation |  |
| German text |  |
| Text-to-text synthesis |  |
| Text-to-text translation |  |
| Speech-to-speech translation |  |

**Part-of-Speech Tagging** Graphical user interface

Description automatically generated

|  |  |
| --- | --- |
| I enjoy studying artificial intelligence |  |
| Pronoun |  |
| Verb |  |
| Adjective |  |
| Noun |  |

Diagram

Description automatically generated**The Importance of Semantics in NLP**

|  |  |
| --- | --- |
| He is blue |  |

**NLP Tasks** Diagram

Description automatically generated

|  |  |
| --- | --- |
|  |  |
| Syntax |  |
| Semantics |  |
| Discourse |  |
| Speech |  |
| Tokenization |  |
| Sentiment analysis |  |
| Text summarization |  |
| Speech-to-text |  |
| Part-of-speech tagging |  |
| Named entity recognition |  |
| Topic identification |  |
| Text-to-speech |  |
| Topic identification |  |
| Question answering |  |

**Comparison of CBOW and Skip-Gram**

Chart

Description automatically generated

|  |  |
| --- | --- |
| ∑ or ø of one-hot vector |  |
| Neurons in hidden layer |  |
| Word vector |  |
| The (sun) is shining outside |  |
| Sun |  |
| CBOW |  |
| Skip-gram |  |
| One-hot vector |  |
| Word vector with missing context |  |

A picture containing timeline

Description automatically generated**Categories of Computer Vision Tasks**

|  |  |
| --- | --- |
| Recognition |  |
| Detect and classify different objects or persons in images |  |
| Motion analysis |  |
| Detect and track the motion of objects, persons, or the camera |  |
| Image restoration |  |
| Filter and remove noise from images and videos |  |
| Geometry reconstruction |  |
| Estimate a 3D model of a real-world object or scene |  |

**Pixels of a Digital Image**

A picture containing diagram

Description automatically generated

**Additive Mixing of Colors**Diagram, venn diagram

Description automatically generated

Table

Description automatically generated **2D Image Convolution**

|  |  |
| --- | --- |
|  | |
| Step 1 |  |
| Step 2 |  |
| Final result |  |

Table

Description automatically generated **Different Padding Techniques**

|  |  |
| --- | --- |
|  | |
| Constant padding |  |
| Replication padding |  |
| Reflection padding |  |

**Radial Distortion Types**  
Chart, treemap chart

Description automatically generated

|  |  |
| --- | --- |
|  | |
| No distortion |  |
| Barrel distortion |  |
| Pincushion distortion |  |
| Mustache distortion |  |

**Tangential Distortion**

Chart, treemap chart

Description automatically generated

**Principle of the Pinhole Camera**

A picture containing text

Description automatically generated

**Projection of 3D World Coordinates onto 2D Image Coordinates**

Diagram

Description automatically generated

|  |  |
| --- | --- |
| 3D world coordinates |  |
| Extrinsic parameters |  |
| 3D camera coordinates |  |
| Intrinsic parameters |  |
| 2D image coordinates |  |

A picture containing graphical user interface

Description automatically generated**Camera Calibration Using a Checkerboard Pattern**

**Detecting Blobs, Edges, and Corners**A picture containing text, indoor, different, vegetable

Description automatically generated

Graphical user interface

Description automatically generated**Edge Detection in an Image**

Graphical user interface

Description automatically generated**Example for Canny Edge Detection**

|  |  |
| --- | --- |
| Original |  |
| Canny edge detection |  |

Graphical user interface, application

Description automatically generated **Example for Sobel Edge Detection**

|  |  |
| --- | --- |
| Original |  |
| Sobel X |  |
| Sobel Y |  |

**Harris Corner Detection**

Diagram

Description automatically generated

|  |  |
| --- | --- |
| Flat |  |
| Edge |  |
| Corner |  |

Graphical user interface, application

Description automatically generated **Example for Semantic Segmentation**

|  |  |
| --- | --- |
| Original image |  |
| Segmentation map |  |
| Segmentation overlay |  |
| Background |  |
| Chair |  |
| Coffee table |  |

**Network Architecture for Semantic Segmentation**

A picture containing diagram

Description automatically generated

|  |  |
| --- | --- |
| Convolutional network |  |
| Downsampling |  |
| Pooling |  |
| Convolution |  |
| Deconvolutional network |  |
| Unsampling |  |
| Unpooling |  |
| Deconvolution |  |