ARTIFICIAL INTELLIGENCE FOR LOGISTICS

The Periodic Table of AI

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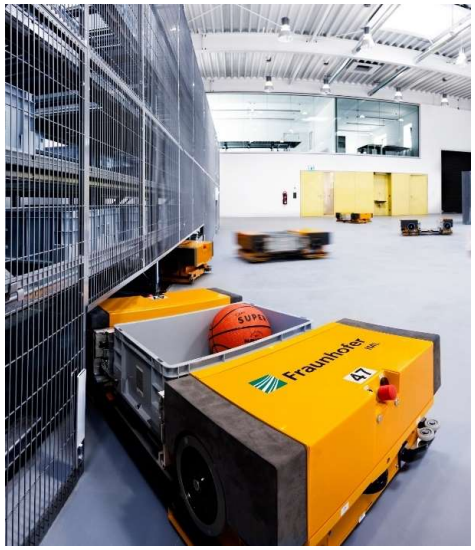

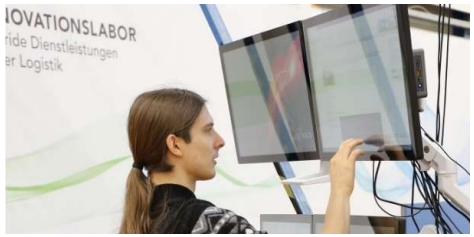

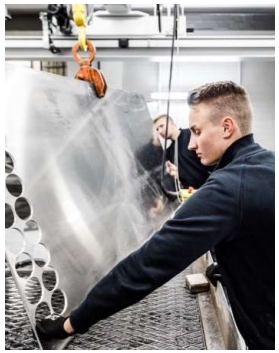

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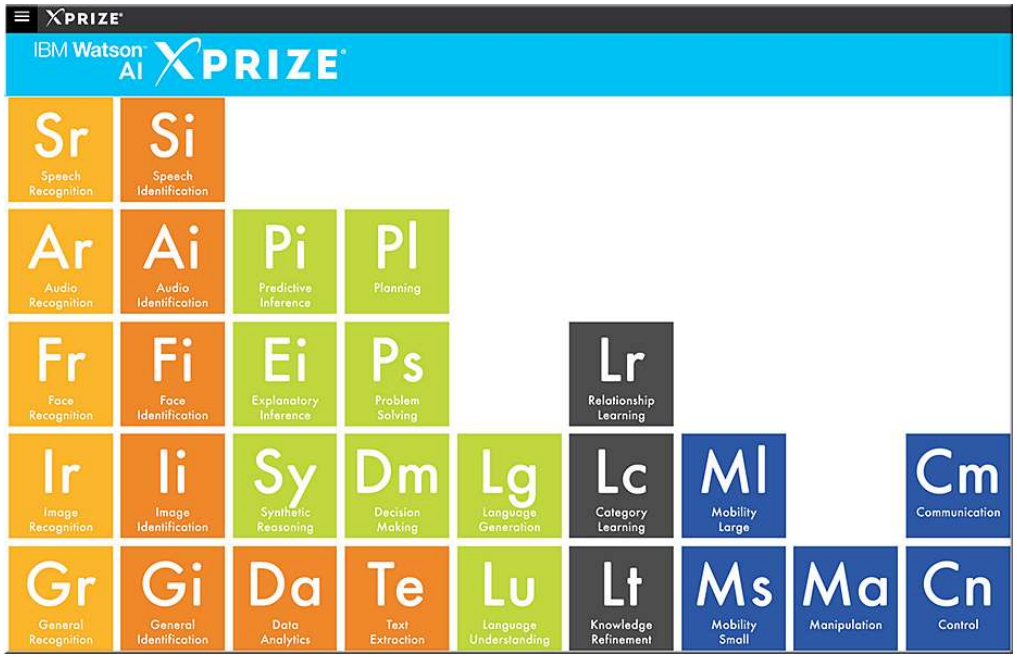
Application Cases for Artificial Intelligence

The Periodic Table of AI



- A model describing different task performed by AI solutions
- AI solutions can be described through a combination of one ore more “atoms” of this periodic table
- Three major areas
  - Assess
  - Infer
  - Respond

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
see also https://www.periodensystem-ki.de/Mit-Legosteinen-die-Kuenstliche-Intelligenz-bauen

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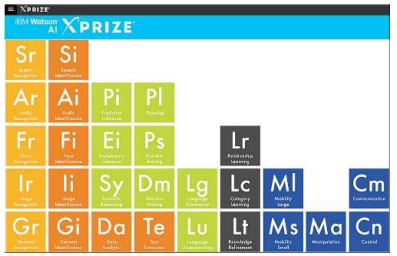
The Periodic Table of Artificial Intelligence Assess Tasks: Recognition



Symbol	Task	Description
SR	Speech Recognition	The recognition of spoken language and/or emotional states in general in an audio signal.
AR	Audio Recognition	Detecting certain types of sounds (alarms, stress noises, engine sounds) in an audio signal.
FR	Face Recognition	Recognizing faces and emotional states in images or video signals.
IR	Image Recognition	The recognition of certain types of objects in images or video signals. Recognizing faces and emotional states in images or video signals.
GR	General Recognition	Analyzing sensor data to recognize object types and/or situations from the signal alone.

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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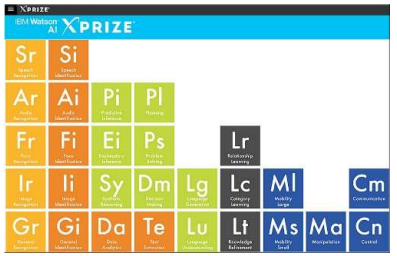
The Periodic Table of Artificial Intelligence Assess Tasks: Identification



Symbol	Task	Description
Si	Speech Identification	The recognition of an individual voice in an audio signal.
Ai	Audio Identification	Recognizing audio signatures (a particular engine or doorbell) from audio signals.
Fi	Face Identification	Identifying specific people in images or video signals.
Ii	Image Identification	Identifying a specific object in an image or video.
Gi	General Identification	Analyzing sensor data to detect objects and/or situations from the signal alone.
Da	Data Analytics	Analyzing data to identify specific facts and/or events that the data represents.
Te	Text Extraction	Analyzing texts to extract information about entities, time, places, and facts contained exclusively in the text.

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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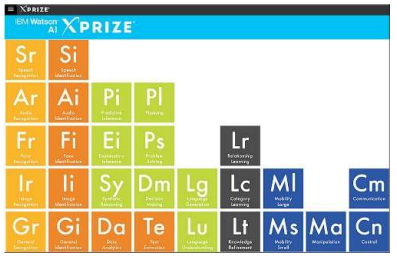
The Periodic Table of Artificial Intelligence Infer Tasks, Part I



Symbol	Task	Description
Pi	Predictive Inference	The prediction of events or conditions in the future based on an understanding of a current state of the world and how the world works.
Ei	Explanatory Inference	Explaining events or states in the real world based on an understanding of past states.
Sy	Synthetic Reasoning	Using evidence to support inferences about the real state of the world, a prediction, or an explanation.
Pl	Planning	Creating an action plan based on a set of goals, an understanding of the real state of the world, and knowledge about actions and their consequences.
Ps	Problem Solving	Creating a solution to a problem.
Dm	Decision Making	Selecting a particular plan or solution based on available evidence, alternative solutions, and a set of objectives.
Lg	Language Generation	Creating natural language texts and/or explanations based on some understanding of the world.
Lu	Language Understanding	Creating a semantic representation of the meaning of a text that shows context and some understanding of how the world works.

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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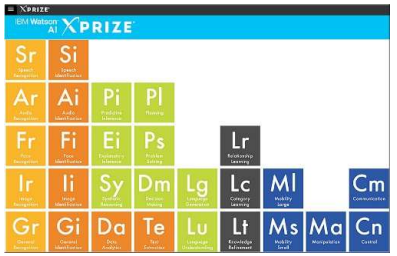
The Periodic Table of Artificial Intelligence Infer Tasks, Part II



Symbol	Task	Description
Lr	Relationship Learning	Identifying relationships between features that can be used to predict the presence of a set of hidden features when others are visible (e.g., correlation between rejected calls and customer churn).
Lc	Category Learning	Recognizing new categories of semantic values based on feature collections.
Lt	Knowledge Refinement	Revising knowledge or rules that already exist in response to using them to support actions or conclusions.

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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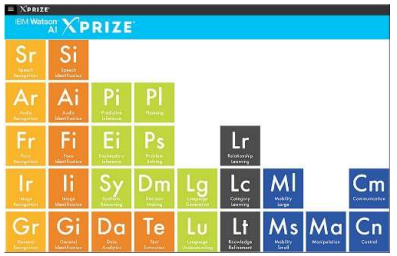
The Periodic Table of Artificial Intelligence Respond Tasks



Symbol	Task	Description
MI	Mobility Large	Controlling autonomous vehicles that interact with other vehicles first and foremost.
Ms	Mobility Small	Controlling robots that move through indoor spaces, working and interacting with humans.
Ma	Manipulation	Manipulating specific objects that people work with on a regular basis.
Cm	Communication	Mechanisms that support the execution of various forms of communication between humans and machines.
Cn	Control	Intelligently controlling other machines when no manipulation or action is required in the physical world (e.g., automated trading).

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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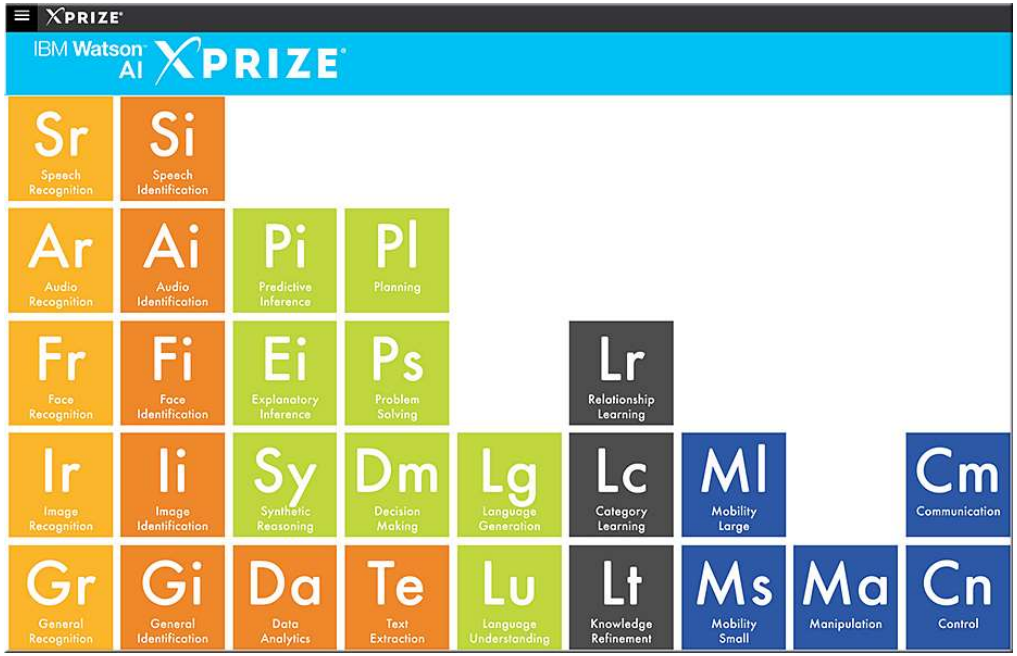
The Periodic Table of AI



- The following slides contain a maturity assessment from the DIGILOGIC project
- Date of the assessment: February 2022

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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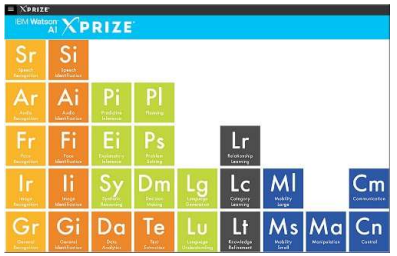
Maturity of AI for Recognition Tasks



Task	Maturity
Speech Recognition	Commercially available
Audio Recognition	Commercially available; training required for specific sounds
Face Recognition	Commercially available
Image Recognition	Commercially available; training required for new images
General Recognition	Commercially available; training required

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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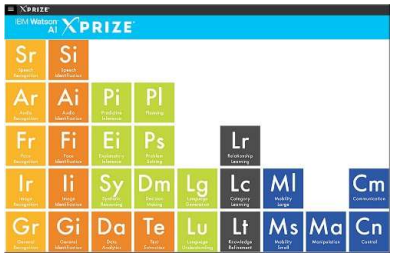
Maturity of AI for Identification Tasks



Task	Maturity
Speech Identification	Commercially available; training required
Audio Identification	Commercially available; training required
Face Identification	Commercially available; training required
Image Identification	Commercially available; training required
General Identification	Commercially available; training required
Data Analytics	Commercially available; training required
Text Extraction	Commercially available; training required

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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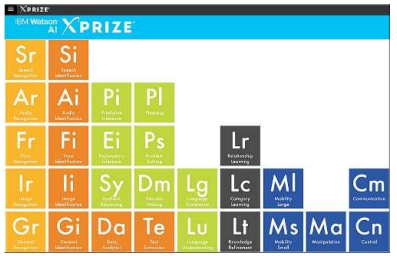
Maturity of AI for Inference Tasks



Task	Maturity
Predictive Inference	Prototypes, commercially available
Explanatory Inference	Prototypes
Synthetic Reasoning	Basic Research Prototypes
Planning	Mostly research
Problem Solving	Science fiction, prototypes, commercially available
Decision Making	Science fiction, prototypes, commercially available
Language Generation	commercially available
Language Understanding	prototypes, commercially available

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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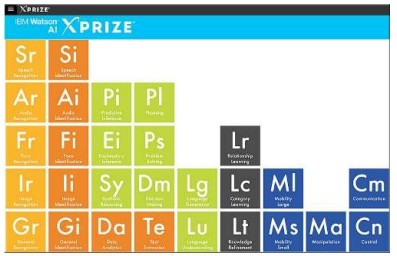
Maturity of AI for Learning Tasks



Task	Maturity
Relationship Learning	Prototypes, commercially available
Category Learning	Prototypes, commercially available
Knowledge Refinement	Prototypes, commercially available

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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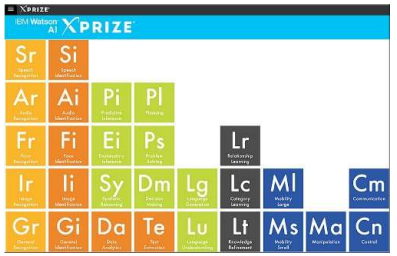
Maturity of AI for Respond Tasks



Task	Maturity
Mobility Large	Commercially available (limited functionality)
Mobility Small	Prototypes, commercially available with very limited functionality
Manipulation	Prototypes, commercially available (for specific tasks)
Communication	Prototypes, commercially available
Control	Commercially available

Sources: http://danielschristian.com/learning-ecosystems/wp-content/uploads/2017/01/AI-PeriodicTable-Dec2016.jpg
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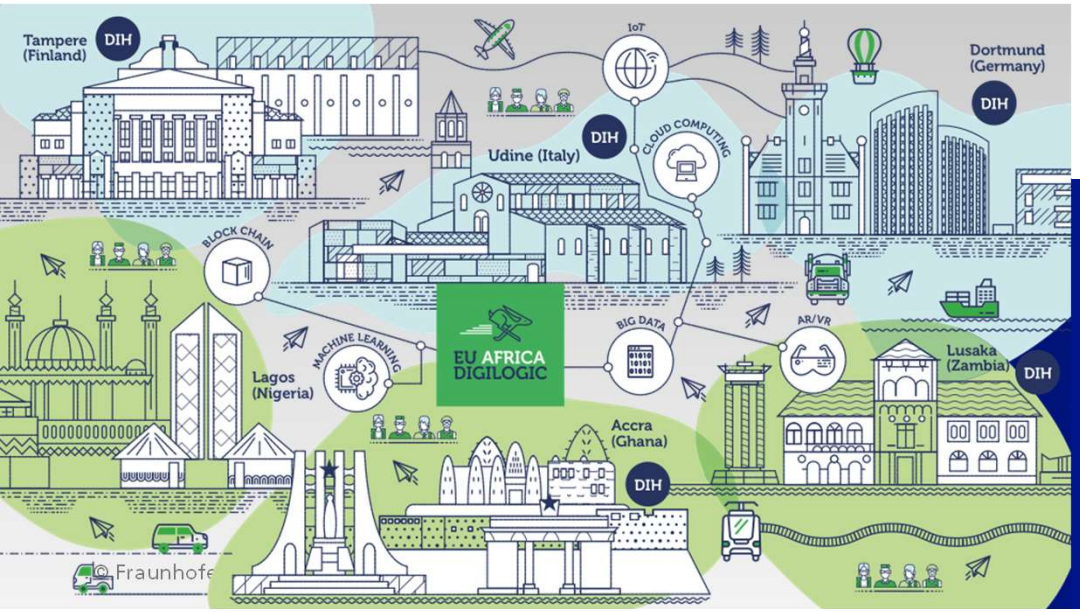
THE DIGILOGIC VISION



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