BRIT KI

AI for Leadership Cheat sheet

Term	Concept	Description /Analogy	Illustration	Real world Example	Relevance to Ki
Artificial Intelligence	The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making	• Goals of AI include learning, reasoning, and perception • Approaches include logical based, probabilistic/ statistical, optimisation based, and statistical learning based	Click to view illustration	Chatbots, facial recognition, autocorrect, digital assistants	The two core components of Ki's algorithm, signal generation and portfolio allocation, are both using different aspects of AI – signal generation mainly leverages machine learning where as portfolio allocation uses mathematical optimisation.
Supervised learning	The task of inferring a function describing the relationship between independent and dependent variables in a dataset (based on labelled examples)	• Machine learns explicitly • Data with clearly defined output is given • Predicts outcome/future • Resolves classification and regression problems	Click to view illustration	Predicting stock price using recurrent neural networks	In signal generation 2.0 we will use supervised machine learning to perform classification or regression tasks that will help to assess how good or bad a risk is, in terms of its profitability and volatility.
Unsupervised learning	The task of inferring a function describing the structure of a dataset (based on unlabelled data)	• Machine understands the data (identifies patterns/ structures) • Evaluation is qualitative or indirect • Does not predict/find anything specific • Can be used for clustering tasks, dimensionality reduction tasks, anomaly detection tasks etc.	Click to view illustration	Customer segmentation, news aggregation, genetics (clustering DNA patterns to analyse evolutionary biology)	Unsupervised learning is widely used in our analysis to identify patterns before create supervised learning models.
Reinforcement learning	An agent's attempt to approximate the environment's function, in order to determine the agent's actions on the black-box environment that maximise the agent's rewards	• Machine learns how to act in a certain environment via reward and punishment mechanism (i.e. +ve and -ve reinforcement to maximise rewards) • Typically used to solve very complex problems by mimicking the learning model of human beings	Click to view illustration	Google DeepMind's Deep Q-learning playing Atari Breakout	Though currently not in use, in future reinforcements learning can potentially be leveraged to learn the best way to allocate portfolio/capital and placing reinsurance.
Deep learning	An agent's attempt to approximate the environment's function, in order to determine the agent's actions	• A definition of the desired outcome and an example set of inputs is provided, after which deep learning algorithm will backward solve the answer to the question • Consists of training, validation then testing phase	Click to view illustration	• Image recognition • Topic analysis	In project Appia, both optical characters recognition (OCR) and natural language processing (NLP) uses deep learning to recognize relevant sections in slips/SOVs.
Classification	Prediction of the discrete-valued target (label) of given data points based on a set of data features	• Involves using supervised learning techniques • Representative approaches to classification include logistic regression, k-nearest neighbours, decision trees, and neural networks	Click to view illustration	Classification of tumors as benign or malign based on appearance & tumor size	In signal generation, we can create classification models by predicting (classifying) whether a specific risk will have a claim (one class) or not (another class).

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Regression	Prediction of a continuous-valued target (predictor) based on a set of data features	• Involves using supervised learning techniques • Representative approaches to regression include linear regression, random forests, and neural networks	Click to view illustration	Prediction of a car's price (output variable) based on the car's mileage (input variable)	In signal generation, we can create regression models by predicting ILR or ULR.
Forecasting	Prediction of future values given current/past values of a time series	• Representative approaches to forecasting include AR, AM, ARMA or ARIMA models	Click to view illustration	Predicting stock price using recurrent neural networks	Forecasting expected premium over the course of a year, using historical premium and other data sources, is a use case we are thinking about in new version Portfolio Allocation.
Clustering	Understanding data objects by placing similar data points within the same cluster and dissimilar ones in different clusters	• Representative approaches of clustering include partition clustering (e.g. k-means), hierarchical clustering, and spectral clustering	Click to view illustration	Clustering algorithms for customer segmentation	Clustering is a common technique that we use in exploratory data analysis to identify consistent patterns of behaviour.
Adversarial learning	A machine learning technique that attempts to fool models by supplying deceptive input	• Involves a game between a data generator and a data discriminator - the discriminator is optimised to distinguish between synthetic data from real data and the generator is optimised to generate synthetic data that resembles real data, fooling the discriminator • Often used to misguide a model with malicious input	Click to view illustration	• Image generation • Deep fakes	A potential use case for Ki is to use adversarial learning to generate data for classes that are lack of data points. This approach is currently investigated in collaboration with UCL M.Sc students.
Transfer learning	A machine learning technique, where a model trained on one task, is re-purposed on a second related task	• Requires an existing model that is pre-trained (on massive amount of data) on a similar task, of which some layers of the original model is retrained for the task at hand • Often used when there is not enough labeled training data for task at hand	Click to view illustration	5 cool ways transfer learning is being used today	Brit data science team did a project using google map to assess damage of buildings. By using transfer learning, we can re-train a readily available model by Google, with few images, to reach higher accuracy.
Meta learning	Learning to learn	• The meta learner learns a meta-model that can be leveraged by the base learner to learn the final model	Click to view illustration	The rise of Meta Learning	In the "Shallow and Broad" phase of our Signal Generation upgrade, we leveraged genetic algorithms to automatically select and train machine learning models for all classes of risks.

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Machine learning process	Machine learning is the study of computer algorithms that improve automatically through experience and by the use of data. There are 6 steps in the ML process	1. Problem Definition - definition of the prediction task e.g. classification task, regression task, etc. 2. Data Collection - collection of relevant data to develop the machine learning models 3. Data Preparation - Preparation of data to develop the machine learning model, including labelling the data 4. Model Selection - Selection of a model out of a plethora of possible models relevant for the prediction task 5. Training - Training the model by optimising its parameters to make sure the model fits (explains) the data 6. Testing - Testing the trained model, to make sure it performs well on held-out data	Click to view illustration	Image recognition, speech recognition, medical diagnosis, virtual personal assistants	Our signal generation model creation went through all the described 6 steps in machine learning processes.
Office for AI	A joint BEIS-DCMS unit responsible for overseeing implementation of the AI and Data Grand Challenge	• Aims to drive responsible and innovative uptake of AI technologies for the benefit of everyone in the UK • Engages with organisations, fostering growth and delivering recommendations around data, skills and public and private sector adoption	Click to view illustration	Official website	One of the key regulatory focus is the explanability of algorithms. We are logging, monitoring and analyse our algorithms, to make sure every line offered is explainable and reasonable.
National Data Strategy	An ambitious, pro-growth strategy that drives the UK in building a world-leading data economy while ensuring public trust in data use	• Aims to spearhead a vision to enable the UK to build a world-leading data economy • Ensures that people, businesses and organizations (a) trust the data ecosystem, (b) can access data seamlessly (c) can operate data effectively	Click to view illustration	Official website	Data lies in the heart of Ki's business, all our algorithm components and decisions are rely on and are driven by data. Therefore a good data strategy is crucial to our business success.
Data Ethics framework	A set of principles to guide appropriate data use in the public sector	• Helps public servants understand ethical considerations, encouraging responsible innovation • Based on overarching principles such as Transparency, Accountability, and Fairness	Click to view illustration	Official website	Though less applicable to Ki, in insurance in general, where individual customer is of concern, any decision made by algorithm (e.g. premium that should be charged over a life insurance policy) decisions need to be explainable. When protected features are used (e.g. race, gender, sexual orientation) there should be a strong plausible reason for using it.

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UK AI Council	An independent expert committee, provides advice to Government and high-level leadership of the Artificial Intelligence (AI) ecosystem	• Works to support the growth of AI in the UK, promoting its adoption in businesses and society • Advises the Office for AI and broader government on its current priorities, opportunities and challenges for AI policy	Click to view illustration	Official website	
Centre for Data Ethics & Innovation	An independent body tasked to advise the UK Government on the ethical dimensions of AI & data-driven technologye	• Brings together people from academia, industry and the society to shape practical recommendations for the government, regulators, and industry • Advises how to deploy data driven technologies within the ethical and social constrains of a liberal democratic society	Click to view illustration	Official website	