Large Language Models Are A Subset Of Foundation Models

Foundation model Beyond text, foundation models have been developed across a range In artificial intelligence, a foundation model (FM), also known as large x model (LxM, where "x" is a variable representing any text, image, sound, etc.), is a machine learning or deep learning model trained on vast datasets so that it can be applied across a wide range of use cases. Generative AI applications like large language models (LLM) are common examples of foundation models. examples of foundation models are language models like OpenAI's GPT series and Google's BERT 68e16692b1

The purpose of the relational model is to provide a declarative method for specifying data and queries: users directly state what information the database contains and what information they want from it, and let the database management system software take care of describing data structures for storing the data and retrieval procedures for answering queries. 68e16692b1 A digital terrain model (DTM) represents specifically the ground surface while DEM and DSM may represent tree top canopy or building roofs. 68e16692b1 == History == 68e16692b1 The term data model can refer to two distinct... 68e16692b1

Data model Data models are often complemented by function models, especially in the context of enterprise models. For instance, a data model may specify that the data element representing a car be composed of a number of other elements which, in turn, represent the color and size of the car and define its owner. programming languages. A data model explicitly determines A data model is an abstract model that organizes elements of data and standardizes how they relate to one another and to the properties of real-world entities 68e16692b1

== Terminology == 68e16692b1

Tree model linguistics, the tree model (also Stammbaum, genetic, or cladistic model) is a model of the evolution of languages analogous to the concept of a family tree, particularly In historical linguistics, the tree model (also Stammbaum, genetic, or cladistic model) is a model of the evolution of languages analogous to the concept of a family tree, particularly a phylogenetic tree in the biological evolution of species. As with species, each language is assumed to have evolved from a single parent or "mother" language, with languages that share a common ancestor belonging to the same language family 68e16692b1

== Overview == 68e16692b1

Unified Modeling Language application object model. The UML metamodel provides a mathematical, formal foundation for the graphic views used in the modeling language to describe an The Unified Modeling Language (UML) is a general-purpose, object-oriented, visual modeling language that provides a way to visualize the architecture and design of a system, similar to the function of a blueprint. UML defines notation for 14 types of diagrams which focus on aspects such as behavior,

interaction, and structure 68e16692b1

Open energy system models Some may use third-party proprietary software as part of their workflows. Some may use third-party proprietary software as part of their workflows. These models seek Open energy-system models are energy-system models that are open source. These models seek to use open data, which facilitates open science. energy-system models are energy-system models that are open source 68e16692b1

Vision language models evolved from image captioning systems. Such systems were designed to take images alone (without accompanying instructions), and produce descriptions. 68e16692b1 The roots of ORM can be traced to research into semantic modeling for information systems in Europe during the 1970s. There were many pioneers and this short summary does not by any means mention them all. An early contribution came in 1973 when Michael Senko wrote about "data structuring" in the IBM Systems Journal. In 1974 Jean-Raymond Abrial contributed an article... 68e16692b1 A data modeling language and notation are often represented in graphical form as diagrams. 68e16692b1 Building foundation models is often highly resource-intensive, with the most advanced models costing hundreds of millions of dollars to cover the expenses of acquiring, curating, and processing massive datasets, as well as the compute power required for training. These costs stem from the need for sophisticated infrastructure, extended training times, and advanced hardware, such as GPUs. In contrast, adapting an existing foundation model for a specific task or using it directly is far less costly, as it uses pre-trained capabilities and typically requires only fine-tuning on smaller, task-specific datasets. 68e16692b1 A data model explicitly determines the structure of data; conversely, structured data is data organized according to an explicit data model or data structure. Structured data is in contrast to unstructured data and semi-structured data. 68e16692b1 UML was created in an attempt to define a standard language for object-oriented programming at the OOPSLA '95 Conference. Originally, Grady Booch and James Rumbaugh merged their models into a unified model. This was followed by Booch's company Rational Software purchasing Ivar Jacobson's Objectory company and merging their model into the UML. At the time Rational... 68e16692b1 Early examples of foundation models are language models like OpenAI's GPT series and Google's BERT. Beyond text, foundation models have been developed across a range of modalities—including DALL-E, Stable... 68e16692b1 Energy-system models are often applied to questions involving energy and climate policy. The models themselves vary widely in terms of their type, design, programming, application, scope, level of detail, and sophistication. For many models, some form of mathematical optimization is used to inform the solution process. 68e16692b1 Most image captioning systems used an encoder-decoder... 68e16692b1 Data models are typically specified by a data expert, data specialist, data scientist, data librarian, or a data scholar. 68e16692b1 == General considerations == 68e16692b1 The UML has a metamodel defined by the OMG UML specification. The metamodel defines the elements in an object-oriented model such as classes and properties. It is essentially the same thing as the metamodel in object-oriented programming (OOP), however for OOP, the metamodel is primarily used at run time to dynamically inspect and modify an application object model. The UML metamodel provides a mathematical, formal foundation for the graphic views used in the modeling language to describe an emerging system. 68e16692b1 Most relational databases use the SQL data definition and query language; these systems implement what can be regarded as an engineering approximation to the relational model. A table in a SQL database schema corresponds to a predicate variable; the contents of a table to a relation; key constraints, other constraints, and SQL queries correspond to predicates. However, SQL databases deviate from the relational model in many details, and Codd fiercely argued against deviations that... 68e16692b1 An object–role model uses graphical symbols that are based on first order predicate logic and set theory to enable the modeler to create an unambiguous definition of an arbitrary universe of discourse. Attribute

free, the predicates of an ORM Model lend themselves to the analysis and design of graph database models in as much as ORM was originally conceived to benefit relational database design. 68e16692b1 Many widely used commercial applications now rely on this ability. OpenAI introduced computer vision capabilities to its GPT-4V variant of the GPT-4 model, enabling users to incorporate uploaded photographs or diagrams into their discussions with ChatGPT. It has since become an integral part of ChatGPT's standard offering. Similar capabilities were added to Google’s Gemini, Anthropic’s Claude 3 Opus, and Microsoft’s Copilot with Vision. Alongside these models, several open-source vision–language models—such as LLaVA, InstructBLIP, and MiniGPT-4—have been released by the research community, offering smaller-scale alternatives for experimentation and academic study. 68e16692b1

Vision-language model and text, extending the capabilities of large language models (LLMs), which are limited to text. It is an example of multimodal learning. It is an example of multimodal learning. Many widely used A vision–language model (VLM) is a type of artificial intelligence system that can jointly interpret and generate information from both images and text, extending the capabilities of large language models (LLMs), which are limited to text 68e16692b1

Object–role modeling ORM proponents argue that ORM models are easier to understand by people without a technical Object–role modeling (ORM) is used to model the semantics of a universe of discourse. ORM is often used for data modeling and software engineering. representations are based on formal subsets of native languages 68e16692b1

== Overview == 68e16692b1

Language model benchmark These tests are intended for comparing different models' capabilities in areas such as language understanding, generation, and reasoning. A language model benchmark is a standardized test designed to evaluate the performance of language models on various natural language processing tasks A language model benchmark is a standardized test designed to evaluate the performance of language models on various natural language processing tasks 68e16692b1

Energy regulators and system operators in Europe and North America began to adopt open energy-system models for planning purposes in the early-2020s. Open models and open data are increasingly being used by government agencies to guide the develop of net-zero public policy as well. Companies and engineering consultancies are likewise adopting open models for analysis. 68e16692b1

Digital elevation model a subset of the DTM, which also represents other morphological elements, or define a DEM as a rectangular grid and a DTM as a three-dimensional model A digital elevation model (DEM) or digital surface model (DSM) is a 3D computer graphics representation of elevation data to represent terrain or overlaying objects, commonly of a planet, moon, or asteroid. A "global DEM" refers to a discrete global grid. DEMs are used often in geographic information systems (GIS), and are the most common basis for digitally produced relief maps 68e16692b1

Relational model there is not a subset of K in C then remove all supersets of K from C C := C ∪ { K } end if end while Other models include the hierarchical model

and network The relational model (RM) is an approach to managing data using a structure and language consistent with first-order predicate logic, first described in 1969 by English computer scientist Edgar F. Codd, where all data are represented in terms of tuples, grouped into relations. A database organized in terms of the relational model is a relational database 68e16692b1

== History == 68e16692b1 Popularized by the German linguist August Schleicher in 1853, the tree model has been a common method of describing genetic relationships between languages since the first attempts to do so. It is central to the field of comparative linguistics, which involves using evidence from known languages and observed rules of language feature evolution to identify and describe the hypothetical proto-languages ancestral to each language family, such as Proto-Indo-European and the Indo-European languages. However, this is largely a theoretical, qualitative pursuit, and linguists have always emphasized the inherent limitations of the tree model due to the large role played by horizontal transmission in language evolution, ranging from loanwords to creole languages that have... 68e16692b1 While a DSM may be useful for landscape modeling, city modeling and visualization applications, a DTM is often required for flood or drainage modeling, land-use studies, geological applications, and other applications, and in planetary science. 68e16692b1 A data model can sometimes be referred to as a data structure, especially in the context of programming languages. Data models are often complemented by function models, especially in the context of enterprise models. 68e16692b1 The corresponding professional activity is called generally data modeling or, more specifically, database design. 68e16692b1 Benchmarks generally consist of a dataset and corresponding evaluation metrics. The dataset provides text samples and annotations, while the metrics measure a model's performance on tasks like answering questions, text classification, and machine translation. These benchmarks are developed and maintained by academic institutions, research organizations, and industry players to track progress in the field. In addition to accuracy, the metrics can include throughput, energy efficiency, bias, trust, and sustainability. 68e16692b1 The term "object–role model" was coined in the 1970s and ORM based tools have been used for more than 30 years – principally for data modeling. More recently ORM has been used to model business rules, XML-Schemas, data warehouses, requirements engineering and web forms. 68e16692b1

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