Will AI take over (Software Development)?

How Artificial Intelligence and Machine Learning may reshape the way we work, live and interact

Introduction | Will AI take over Software Development?

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Definitions | What is Software Development?

Software Development incorporates

- **Designing**
- **Coding**
- **Testing**
- **Deploying**
- **Maintaining**

Computer and Smart **Device** Applications

Common **Deployment Targets**

- **Smartphone** Apps
- Web **Servers**
- **IoT** (Smart Home)
- **Machines**
- **Vehicles**

Definitions | Artificial Intelligence

AI simulates Human Intelligence in Computer Systems

Tasks

- **Problem solving**
- **Decision making**
- **Communication** (e.g. via Natural Language)
- **Pattern Recognition**
- **Learning** from **Data**

Definitions | Artificial Intelligence | Variants

Weak AI (narrow AI)

- Designed for **specific tasks**
- with **predefined Boundaries**
- **No general intelligence**

Examples

- **Communication** via Speech Recognition : Siri
- Media **Recommendation** Systems via Predictive Analysis : Netflix, Spotify
- Image **Recognition** : Google Reverse Image Search
- Content and Image **Generation** : Based on Probabilities derived from LLM

Definitions | Artificial Intelligence | Variants

Strong AI (AGI - Artificial General Intelligence)

- **Cognition**
- **Autonomy**
- **Learning** Capability
- **Self Awareness** (?)

Would pass the **Turing Test** (behaves like a human being)

Examples:

None. AGI is a **Theoretical Concept**

Definitions | AI Development & Machine Learning Terminology

Autonomous: Without the need 3rd-party and/or human intervention
Bias: Assumptions made by a model to simplify the learning process
Deep Learning: Learning from data structures and relations
General AI: Capable of any intellectual task that can be done by any human being.
Hyperparameter: (External) variables that affect the model learning process
Intent: Equivalent label for a goal. “turn the volume down” -> “decrease volume”
Machine learning: Algorithm based learning and adaption to incoming data
Machine translation: Autonomous translation of text by an algorithm
Model: Product of AI training by machine learning algorithms on training data
Neural network: Computer system designed to function like the human brain
Natural language generation (NLG): Turning structured data into text or speech
Natural language processing (NLP): Ability to perform conversational tasks, recognition of intended meaning and intelligible response

Definitions | AI Development & Machine Learning Terminology

Overfitting: Symptom of ML training: Algorithm is only able to work on or identify specific examples present in the training data
Parameter: A variable inside the model that helps it to make predictions
Predictive analytics: Forecast based on historical data and trends
Python: A popular programming language used for general programming
Reinforcement learning: Encouraging the model to improve by testing variants of what it has already learned, usually including human intervention and assessment
Semantic annotation: Tagging different search queries or products with the goal of improving the relevance of a search engine
Sentiment analysis: Identification and Categorization efforts to determine the author's attitude

Definitions | AI Development & Machine Learning Terminology

Supervised learning: Subset of ML using structured datasets enriched with labels and annotations
Test data: Unlabeled data used to check that a ML model is capable of a given task
Training data: Data used during the process of training an ML algorithm
Transfer learning: Improving result accuracy by using gathered learning data to be applied to related tasks
Turing test: A machine's output is indistinguishable from that of a human.
Unsupervised learning: Form of training where the algorithm is asked to make inferences from datasets that don't contain labels
Validation data: Data to test and analyze a model´s response against new data to minimize overfitting
Variance: Providing a model with data changes while being trained to avoid overfitting and low predictive accuracy

Definitions | AI Development & Machine Learning Terminology

Variation: Different inputs with identical purpose or goal. For example, if the intent is “pay by credit card,” the variation might be “I’d like to pay by card, please.”

Artificial Intelligence | Historical Context | Milestones

- **Expert Systems (1960s-1980s)**: In the early years, AI development was driven by expert systems. These systems aimed to **capture the knowledge of human experts** in various fields and **use it to solve problems**. They found applications in **medical diagnosis**, **financial analysis**, and more

- **Machine Learning Emerges (1980s-1990s)**: The emergence of machine learning (ML) as a subfield of AI marked a significant shift. ML algorithms allowed computers to **learn from data** and **make predictions** or **decisions without being explicitly programmed**. This innovation laid the foundation for modern AI and its applications in software development

Artificial Intelligence | Historical Context | Milestones

- AI in **Natural Language Processing (NLP)**: The 2000s saw breakthroughs in natural language processing, enabling machines to **understand** and **generate human language**. This was pivotal for **chatbots**, language **translation**, and **content generation** in software

- **Big Data and Deep Learning (2010s)**: The proliferation of big data and advancements in deep learning fueled the **rapid growth of AI**. Deep learning algorithms, particularly **neural networks**, demonstrated remarkable performance in **image and speech recognition**.

Artificial Intelligence | Historical Context | Pioneers

Alan Turing

- Created his **Universal Machine** (1930s)
- Invented the **Turing Test** (1950) to tell Computers and Humans apart

John McCarthy

- Coined the Expression “Artificial Intelligence” (1955)
- Stanford AI Project (1971)

Artificial Intelligence | Historical Context | Pioneers

Marvin Minsky

- Co-Founder **AI Lab** at **MIT**
- Researched neural networks

Herbert Simon

- Developed the Concept of **limited rationality**

Artificial Intelligence | Historical Context | Pioneers

Geoffrey Hinton

- **Neural Network** and **Deep Learning** Pioneer
- Former Google Executive

Fei-Fei Li

- Pioneer of **Humanistic AI**
- Researcher of **Diversity in AI**

Artificial Intelligence | Historical Context | Take Aways

Alan Turing coined the **Turing Test**
(cf. **C**ompletely **A**utomated **P**ublic **T**uringTest to tell **C**omputers and **H**umans **A**part)

Late Stanford Professor **John McCarthy** invented the term **Artificial Intelligence** and founded the **AI Lab** at the **MIT** together with **Marvin Minsky**

Also referred to as Godfather of AI, **Geoffrey Hinton** has become a vocal admonisher of the Dangers of uncontrolled AI progress

AI in Practice | Examples

AI-powered Apps: A rapidly emerging market

The **AI Hype** has created a huge amount of Applications in different market segments:

- **Content** Creation
- **Design**
- **Chat** Bots
- **Marketing**
- Business **Intelligence**
- Data **Analysis**
- **Media** Production
- **Productivity** Tools

AI in Practice | Examples | Generative Chat Bots

Generative Chat Bots

Probably the most disruptive new tech innovations in recent years is **Chat GPT**.

It features

- **Natural Language** Understanding
- **Human-like** text **responses**
- Contextual **Awareness**
- **Customization**
- **Ethical** Use and **Safety** Measures

AI in Practice | Examples | Speech Recognition

Speech Recognition and Audio Transcription

Similar to the **Siri** Assistant on iPhone, **MacOS** (Monterey 12.4+) also provides a **built-in Dictation and Audio Transcription** Feature which is powered by AI and performs a **Speech To Text** transcription

It can be activated under
System Preferences / Keyboard / Dictation

and used by pressing **ctrl twice** while focusing
a text input

AI in Practice | Examples | Reverse Image Search

Reverse Image Search

Google Lens is capable of a **reverse search** which uses a given image to present the user with results resembling the original file

It can be used to

- find the **original source**
- find **similar variants**

of given images

AI in Practice | Examples | Smart AI Devices

Humane AI Pin

Screenless, standalone device which combines **projectors, cameras and AI technology.** The mini projector **replaces** the conventional **smartphone** screen and is supported by a **camera** and a **speaker.**

First introduced at a Ted Talk in May.

Gadget´s features include the ability to

- **make calls**
- **project details** onto the user's hand
- provide real-time **AI translation**

AI in Practice | Getting Started with AI Development

Which Programming Languages and Frameworks are best for AI Development?

1. **Python** (TensorFlow, Keras, PyTorch, SciKit-Learn)
2. **R** (Carte, Random Forest, Glmnet)
3. **Java** (Weka, Deeplearning4j, Apache Mahout)
4. **C++** (TensorFlow, Caffe)
5. **Matlab** (built-in functions and tools for machine learning)
6. **Julia** (Flux.jl, MLJ.jl)
7. **Scala** (Apache Spark, Breeze)
8. **JavaScript** (TensorFlow.js, Brain.js, ConvNetJS)
9. **Swift** (Apple Core ML)
10. **Go** (TensorFlow Go)

AI in Practice | ML Frameworks

Most popular Machine Learning / Deep Learning Frameworks

1.	**SciKit-Learn**	82%
2.	**TensorFlow**	53%
3.	**XGBoost**	48%
4.	**Keras**	47%
5.	**PyTorch**	34%
6.	**LightGBM**	25%
7.	**Catboost**	14%
8.	**HuggingFace**	11%
9.	**Prophet**	10%
10.	**Caret**	10%

[...]

AI in Practice | ML Frameworks | SciKit-Learn

SciKit-Learn : The top pick Python ML Tool for Data Scientists

Open-Source, based on **NumPy**, **SciPy** and **MatPlotLib**, suitable for

- **Classification** (spam detection)
- **Regression** (stock market and price forecasting)
- **Clustering Models** (identification of hidden patterns, data point grouping)
- **Dimensionality Reduction** (data feature reduction)
- **Evaluation** (performance assessment: accuracy, precision, recall)

Source: **SciKit-learn** | Machine Learning in Python

AI in Practice | ML Frameworks | TensorFlow

TensorFlow / Keras : Allrounders in Machine and Deep Learning

Open-Source, developed by **google** and best for

- **A wide array of Downstream Tasks** (ML model post-processing)
- **Native support** by many Programming Languages (Python, C++, JavaScript, Go)

Keras is built atop of TensorFlow and provides

- **Neural Network Block Modularity** (improve model architecture reusability)
- a **steep learning curve**
- code-base in **Python**

AI in Practice | ML Frameworks | XGBoost

XGBoost : Gradient Boosting Library

Open-Source, best known for

- **parallel tree boosting**
  (improves model training speed and predictive accuracy)
- **efficiency** (on devices with limited resources)
- **cross-platform portability** (C++, Java, Python, R, Julia, Perl, Scala)

Source: **dmlc** XGBoost | Scalable and Flexible Gradient Boosting

AI in Practice | Voice Swap Audio Application

NVIDIA Nemo | Voice Swap Application Example

Example Application to showcase some of the features of the NVIDIA NeMo Library

It will swap a voice in an audio fragment with a computer generated one by

- **Speech Recognition** and Audio **Transcription**
- **Punctuation** and **Capitalization** Addition (via Natural Language Model)
- **Spectrogram** creation
- Audio **Waveform generation** (text to speech)

Source: **Colab Google Research** | NeMo Voice Swap App

AI in Practice | Voice Swap Audio Application

NVIDIA Nemo | Voice Swap Application Example

Original Audio:

Recognized Text:
Ladies and gentlemen, let me tell you one thing artificial intelligence is a no brainer.

Swapped Voice Audio:

Screencast Source: **Colab Google Research** | NeMo Voice Swap App

AI in Practice | Problems and Limitations | Privacy Concerns

When confidential information gets public

“Samsung engineers used the chatbot to quickly **fix errors** in their **source code** and used it to transmit data that should not be made public. Over a 20-day period, Samsung documented **three cases** in which the use of ChatGPT resulted in **data leaks**. These events occurred in quick succession. In one case, an employee entered confidential test samples designed to identify defective chips in order to then optimize them.

In another case, an employee used an **Audio Transcription Tool** to convert a **meeting recording** into a document before submitting it to Chat GPT to prepare a **presentation**.”

AI in Practice | Problems and Limitations | Privacy Concerns

When confidential information gets public

Things **not to share** with **AI chatbots:**

- Writing about your **financial details**
- **confidential** workplace **information**
- application **secrets** and **credentials**
- **personal** information

Most Chatbots **retain** your **chat history** and may **share** aggregated data with **third-party entities**.

Source: Golem: **Data Leaked while using AI Tools**

AI in Practice | Problems and Limitations | Iterative LLM Degradation

Degenerative AI : Training AI models on machine-generated data leads to collapse

AI LLMs which are trained on machine generated data will lead to

- Data Collection **Pollution**
- **Impaired Quality** of generated Content
- Model **Collapse**

Large language models are trained using **human-generated text** scraped from the Internet, and fine-tuned using further human input. When AI models are learning from machine-generated data, **major degradation** comes with each **iteration** with some original data preserved. This ultimately causes synthetic data to be of **lower quality** with distorted results and may eventually lead to **model collapse**.

AI in Practice | Problems and Limitations | Spread of False Information

Spread of False or Misleading Information

Sometimes generative **Chat Bots fail** at

- **basic math**
- answering **simple logic** questions
- **reproducing facts** correctly

This "**hallucination**" of fact and fiction, as it's been referred to, is especially dangerous regarding things like **medical advice** or getting the facts right on key **historical events**.

AI in Practice | Problems and Limitations | Spread of False Information

Do not blindly rely on Generated Output

OpenAI concedes that "ChatGPT sometimes writes **plausible-sounding but incorrect** or **nonsensical** answers." ChatGPT arrives at an answer by making a series of probable guesses, which is part of why it can argue wrong answers as if they were completely true.

When asked to describe the picture in a URL, **Bing** should have admitted it can't complete the request. Instead, Bing described in great detail a **red and yellow macaw**—the URL, in fact, showed an image of a **man sitting**.

Source: **8 Big Problems with OpenAI's Chat GPT**

AI in Practice | Problems and Limitations | Chat GPT on Steroids

Abuse of AI-driven Chatbots and their generated Content

Some users **jailbreaked Chat GPT**, resulting in an AI model that could **bypass guard rails** meant to prevent it from generating **offensive** and **dangerous** text.

A circulating unrestricted AI clone model named Dan, short for "Do Anything Now." led to hackers ramping up online scams, creating malware and phishing emails.

Trying to spot a phishing email designed to extract sensitive details from you is far more difficult now with AI-generated text. ChatGPT can fluently write all kinds of text, from essays to poems and, of course, dodgy emails.

Source: **8 Big Problems with OpenAI's Chat GPT**

AI in Practice | Problems and Limitations | Take Aways

The usage of Generative AI comes with a set of problems and limitations like

- **Leaking** confidential or private **Data**
- **LLM Degradation** and **Model Collapse** when AI Models are trained by generated content
- **Spread** of **false, biased** or **misleading information**
- possible **abuse** by malevolent actors (phishing, scam, diffamation)

AI-driven Software Development | The Benefits

- **Automated Code Generation**: AI-powered tools can generate code based on high-level descriptions, **accelerating** software development.

- **Code Review and Optimization**: AI systems can **review** code for errors, security vulnerabilities, and performance bottlenecks, facilitating code improvement.

AI-driven Software Development | The Benefits

- **Bug Detection and Resolution**: AI-driven testing tools can **identify** and even automatically **fix** software bugs, **reducing** development time.

- **Predictive Analysis**: AI can analyze **historical data** to predict software defects, helping teams allocate **resources** more effectively.

AI-driven Software Development | The Benefits

- **Recommendations and Personalization**: AI can provide intelligent recommendations for software customization or user experiences based on individual **preferences** and **behaviors**.

- **Continuous Integration and Deployment (CI/CD)**: AI is instrumental in automating the CI/CD pipeline, enabling **faster** and more **reliable** software **delivery**.

- **Adaptive Interaction**: Chatbots and virtual assistants powered by AI can interact with users in **natural** language, enhancing **user experiences** in software applications.

AI-driven Software Development | The Benefits

AI can be used to improve

efficiency, **productivity** and **effectiveness**

of software development cycles by **automation** of

- **mundane**
- **time-consuming**
- **repetitive**

tasks.

AI-driven Software Development | Benefits | Take Aways

AI can provide powerful **assistance** for Developers to create **better code faster**

AI excels at performing **time-consuming** and **mundane tasks**

AI-driven Development empowers Developers to **focus** on **creativity**, **ethical awareness**, **compliance** and **UX optimization**

AI can bring **optimization**, enhanced **efficiency** and **security** to the table

AI-driven Software Development | Limitations

Genuinely **Human** qualities which **AI struggles** to replicate in the field of Software Development

- Innovation
- Critical Thinking
- Adaptivity
- Creativity
- Cognitive Intelligence
- Empathy
- Self-Reflection

AI-driven Software Development | Limitations

AI-driven Software Development may lead to **errors** by providing

- **inaccurate** suggestions
- **outdated source** code
- **misleading** results
- poor **code quality**

AI-driven Software Development | Limitations | Take Aways

AI-driven Software Development cannot replace

- **creativity** and **innovation**
- **cognition, critical thinking** and **self-reflection**
- **problem-solving**
- **oversight**
- **empathy**

Therefore, some genuinely human elements remain **indispensable** and successful **collaboration** between Humans and AI remains crucial - for now

AI-driven Software Development | Tools | Coding Assistants

AI-powered Coding Assistants

- GitHub **Copilot**
- Amazon **CodeWhisperer**
- **Tabnine**
- **Replit**
- **Sourcegraph Cody**
- **AskCodi**
- **Codiga**
- **Bugasura**

[...]

- code **suggestions** and completion
- **natural language** code **generation** (translate comments to code)
- automated **bug detection**
- performance **optimization** hints
- **documentation** generation
- Seamless IDE **integration**
- **explanation** of legacy code
- **porting** code syntax

AI-driven Software Development | Tools | App Generators

AI-powered App Generators

- **AppyPie**
- **Bubble.io**
- **Builder.ai**
- **Glide.ai**
- **Brancher.ai**
- **Apsy.io**
- **Zoho Creator**
- **Mendix**

  [...]

- **no coding** skills required
- use natural language to create **apps**
- **customization** of generated apps

- **rudimentary feature sets**
- many **adjustments** needed after app generation
- low code **quality**
- missing code **readability**
- possible **security flaws**

AI’s social impacts | Potential Threats

What worries you about using AI?
German Survey, 2019

- 72% Hacker Attacks
- 71% Manipulation
- 67% Fatal AI Errors
- 62% Dehumanization
- 61% Increasing Dependency
- 57% AI surpassing Humans
- 56% Job Displacement

AI’s social impacts | Potential Threats

Adverse Effects caused by **blind trust** in and **careless usage** of machine driven Development:

- Missing **Transparency**
- **Bias** and compromised Fairness in AI **Algorithms**
- Lack of **Accountability**
- Unintended Propagation of **False Facts**
- **Job Displacement**
- **Ethical** Implications
- Elevated **Security** Flaws
- **Loss of Control**
- Human **Knowledge Degeneration**

AI’s social impacts | Potential Threats | Job Displacement

Jobs most affected by the evolution of AI

- **Data Entry** Clerks
- **Telemarketers**
- Routine Customer **Support** Representatives
- **Manufacturing** and **Assembly Line** Workers
- **Cashiers** and Retail **Salespeople**
- Administrative **Assistants** for basic tasks
- Predictive and Routine **Data Analysts**
- **Bookkeeping** and **Accounting** Clerks
- **Textile Workers** in routine processes
- Basic **Legal** Research Assistants

Loss of Control

Machine-generated code may cause to several **negative effects**, especially when it leads to code that is unreadable for humans:

- **Maintainability** & **Debugging** Challenges
- **Lack** of **Transparency**
- Limited **Collaboration**
- **Knowledge Transfer** impediments
- **Vendor Lock-In**
- **Compliance** and **Regulatory** Concerns
- **Cybersecurity** Implications

AI’s social impacts | Potential Threats | Accountability Gap

Lack of Accountability and Liability

Are manufacturers and/or developers be liable when AI gets out of hands and autonomous machines create **harmful** effects and/or **loss of lives**, e.g. when

- autonomous **vehicle accidents**
- warfare cause **civilian casualties**
- **medical assistants** fail

AI’s social impacts | Potential Threats | Dependency on AI

Possible negative social effects caused by AI

When human societies become overly dependent on artificial intelligence, this may lead to adverse effects like

- **vulnerabilities** to technological failures, hacking, cyber attacks
- social **isolation**
- **dehumanization** and loss of **social cohesion**
- decline in **empathy**
- negative impact on **mental health**

Augmented Discrimination

Societies overly reliant on AI-driven technologies may suffer from adverse side-effects like

- Amplification of **Discriminating Biases**
- **Algorithmic redlining** (insurance approval, loan conditions)
- **Digital Divide** and **Exacerbation** of **Wealth Inequality** (augmentation of socio-economic disparities by uneven access to AI-driven tools and resources)
- Automation **Displacement** (routine and low-skilled jobs)

Increasing Market Domination by American AI Companies

American companies will likely expand their **market domination** in the field of AI just as they currently dominate the **IT market**.

This may lead to furtherly diverging **imparity** and **loss of innovation** in other countries.

AI’s social impacts | Risks and Threats | Take Aways

Uncontrolled AI development may cause adverse consequences such as

- **Loss of Control**
- **Ethical** Problems
- **Discrimination** Bias
- **Transparency** (e.g. generated code becomes unreadable)
- **Accountability** (e.g. missing liability in case of fatalities)
- Human **Knowledge Degeneration**

AI’s social impacts | Precautions and Counter Measures

Precautions and Counter Measures needed to mitigate and counter effects of AI’s potentially negative social impacts

- **Compliance** supervision
- **Awareness** of **discriminatory Bias**
- **Supervision** of Algorithms and ML
- **Ethical** Guidelines
- **Transparency**
- **Accessibility**

AI’s social impacts | Precautions and Counter Measures| Take Aways

Precautions and Counter Measures to address potential threats of AI-driven Development

- **Compliance** supervision
- **Awareness** of **discriminatory Bias**
- **Supervision** of Algorithms and ML
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- **Accessibility**

Outlook | AI Disruption - Dawn of a golden Era?

- **Efficiency and Productivity**: Self-programming computers will be able to **identify** and **rectify errors** and improve system **reliability** and **reducing downtime**

- **Innovation Acceleration**: Exploration and development of innovative solutions at an unprecedented pace will lead to breakthroughs in fields like **medicine**, **materials science**, and the **evolution** of artificial intelligence.

- **Personalized Experiences**: AI-driven computers can tailor software and services to individual user preferences, **enhancing user experiences** and customer **satisfaction**.

Outlook | AI Disruption - Dawn of a golden Era?

- **Autonomous Systems** that adapt to dynamic environments in real-time will make **transportation** and **logistics safer** and more **efficient**
- Constant **monitoring** and patching vulnerabilities will bolster **cybersecurity**
- Resource Optimization will improve **energy usage** and **resource allocation**, contributing to **environmental sustainability**.
- Reduced Programmer Dependence will require less manual coding, the demand for traditional software development may decrease, potentially **reshaping** the **job market**.

Outlook | AI Disruption - Golden Era | Take Aways

AI driven Development may **revolutionize technology and society** by

- **acceleration** of scientific **progress**
- revolutionizing **public transport** (with autonomous vehicles)
- optimizing **resource allocation**
- creation of **new job roles**
- increasing **prosperity** and elimination of poverty
- reduction of **working time** and fostering **individual freedom**
- acceleration of **social transformations**
- providing **sustainable** solutions to **environmental** challenges like **global warming**, efficient **production** and **recycling**

Outlook | AI Dystopia?

In a pessimistic scenario, AI driven Development may lead to a bleak future by

- letting autonomous machines take over **total control** over human lives
- easing the establishment of **surveillance states**, eroding privacy and civil liberties
- **amplifying social inequalities** if only the powerful benefit from achievements
- **loss of accountability** for errors or malicious actions taken by machines
- creating **existential threats** for the very survival of humanity
- fostering the **depletion of resources** in absence of safeguards
- provoking **rebellion** against the influence of self-programming systems, leading to **societal upheaval** and **conflict**

Outlook | AI Dystopia?

Total Control: Autonomous self-programming systems, if unchecked, might gain unchecked power and control over crucial aspects of society, from infrastructure to personal lives.

Loss of Autonomy: Humans may become overly reliant on self-programming computers, surrendering their decision-making autonomy to these opaque and powerful entities.

Loss of Accountability: The complexity of self-programming systems might make it difficult to assign responsibility for errors or malicious actions, leading to a lack of accountability.

Outlook | AI Dystopia?

Surveillance State: Self-programming systems, with their ability to adapt and evolve, could enable pervasive surveillance, eroding privacy and civil liberties.

Inequality Amplification: The technology could exacerbate social inequalities, with only the most affluent or powerful entities benefiting from its capabilities, leading to a greater digital divide.

Existential Threats: Self-programming computers might make decisions that threaten the very survival of humanity, especially if ethical safeguards fail.

Outlook | AI Dystopia?

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Conclusion | And the Winner is?

Cornerstone of any **HI/AI Collaboration** must be the **awareness** of HI's and AI's unique features and a system of **Checks and Balances**

In order to mitigate risks and threat of AI evolution **regulations** are crucial regarding

- **Ethical Considerations**
- **Compliance**
- **Discrimination Bias**
- **Transparency**
- **Accessibility**
- **Liability**

Q & A and Discussion

Which Jobs will Generative AI come after first?

- **Tech** (Coders, Engineers, Data Analysts)
- **Media** (Content Creation, Advertising, Journalism, Graphic Design)
- **Legal Industry** (Paralegals, Legal Assistants)
- **Market Research**
- **Education** (Teachers, Lecturers)
- **Finance** (Financial Analysts, Financial Advisors, Accounting)
- **Trade** (Stock Exchange Experts)
- **Customer Service**

Q & A and Discussion

How will AI impact job roles within software development?

AI may **automate** some tasks and may therefore lead to **Job Displacement** in some areas but it will also create new roles focused on

- **AI Development**
- **Prompt Engineering**
- **Ethics** in AI
- **Governance**

Q & A and Discussion

How can bias amplifications be countered in AI-driven software development?

Bias amplification can be prevented through

- **diverse** data
- bias **audits**
- **fairness-aware** machine learning techniques & algorithms

Q & A and Discussion

What's the role of explainability in AI systems and Code Generation?

Explainability and **Oversight** must be put in place to ensure that generated code and AI-driven decisions remain

- **transparent**
- **responsible**
- **reproducible**
- **reliable**
- **rational**
- **balanced** and **unbiased**

Q & A and Discussion

What can we expect from "AI-augmented development"?

AI-augmented development is the idea of AI

- automating **routine** and **scaffolding** tasks
- providing **suggestions**
- performing **code completions** and **corrections**
- optimizing **bug prediction, detection** and **elimination**
- enhancing **rapid prototyping**

Q & A and Discussion

What are the benefits of "AI-augmented development"?

D**evelopers** are enabled to put an additional **focus** on

- **creative aspects** of software development
- enhancing **user experience**
- **oversight** and **decision-making**
- **security**, **confidentiality, data integrity** and **privacy protection**