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INFORMATICS

AI Today – Trends

Introduction to Machine Learning

Computer Science BSc Course, ELTE Faculty of Informatics

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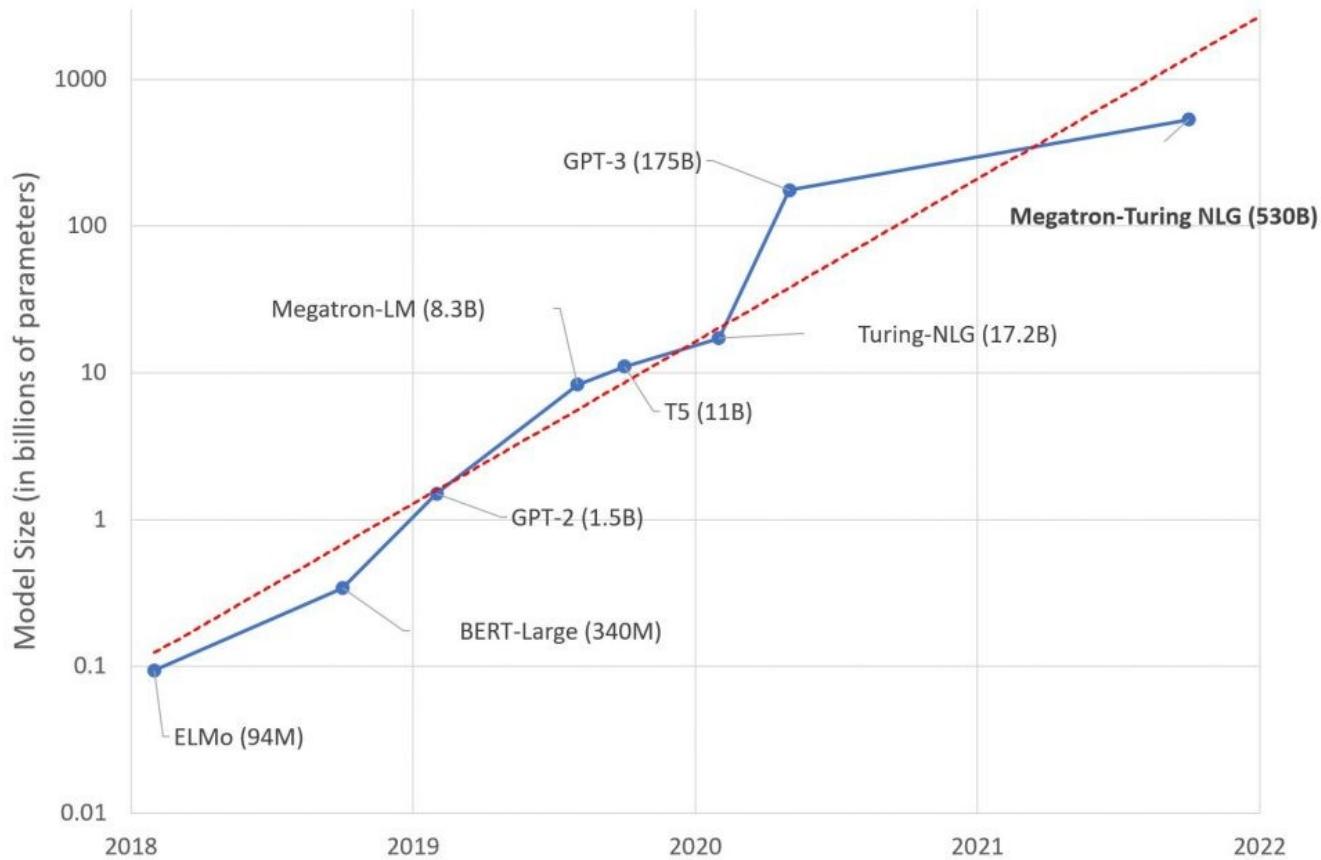
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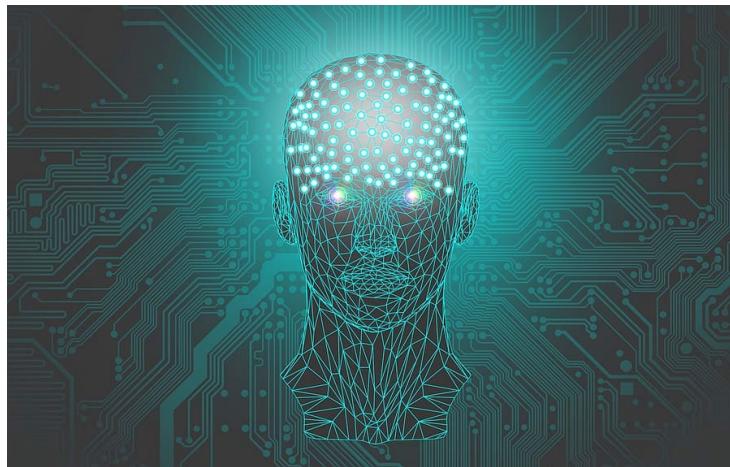
Trends - Not Discussed Today



<https://www.microsoft.com/en-us/research/blog/using-deepspeed-and-megatron-to-train-megatron-turing-nlg-530b-the-worlds-largest-and-most-powerful-generative-language-model/>



Trends Discussed - Specialisation



Role



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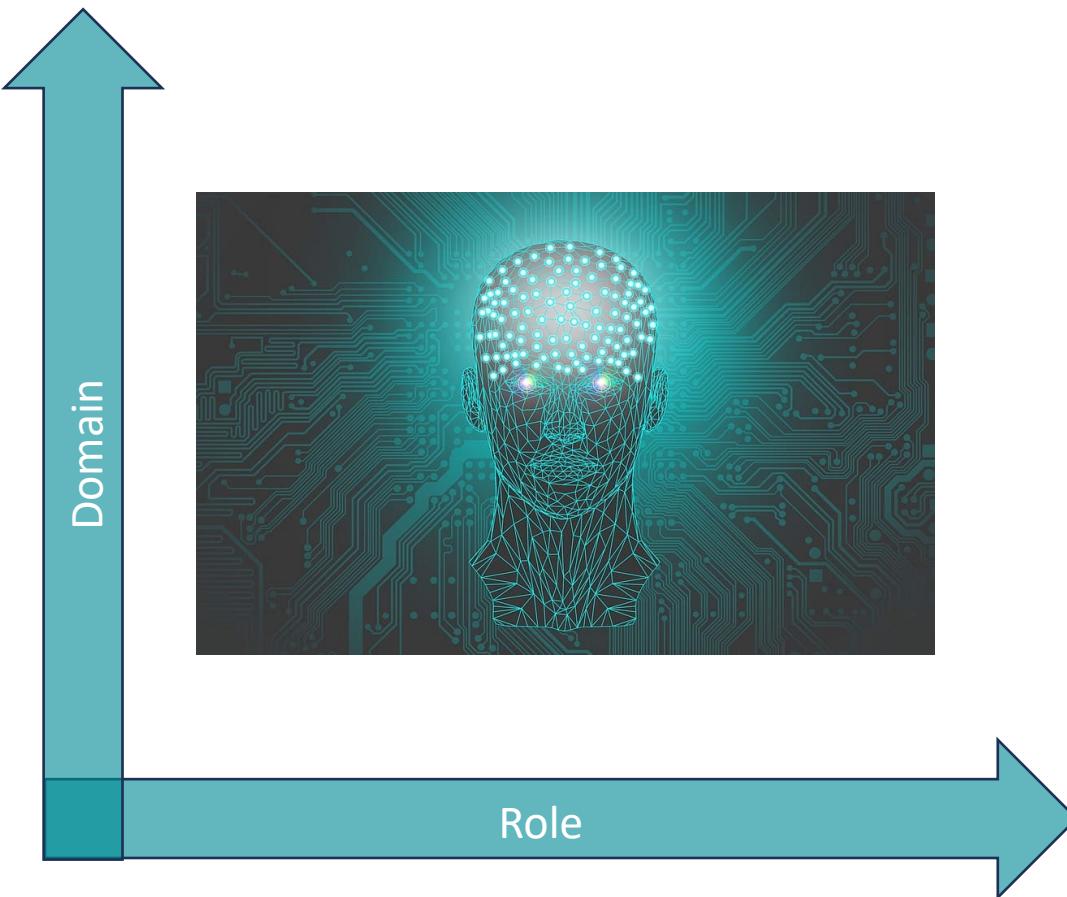
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Trends Discussed - Specialisation



Analogy



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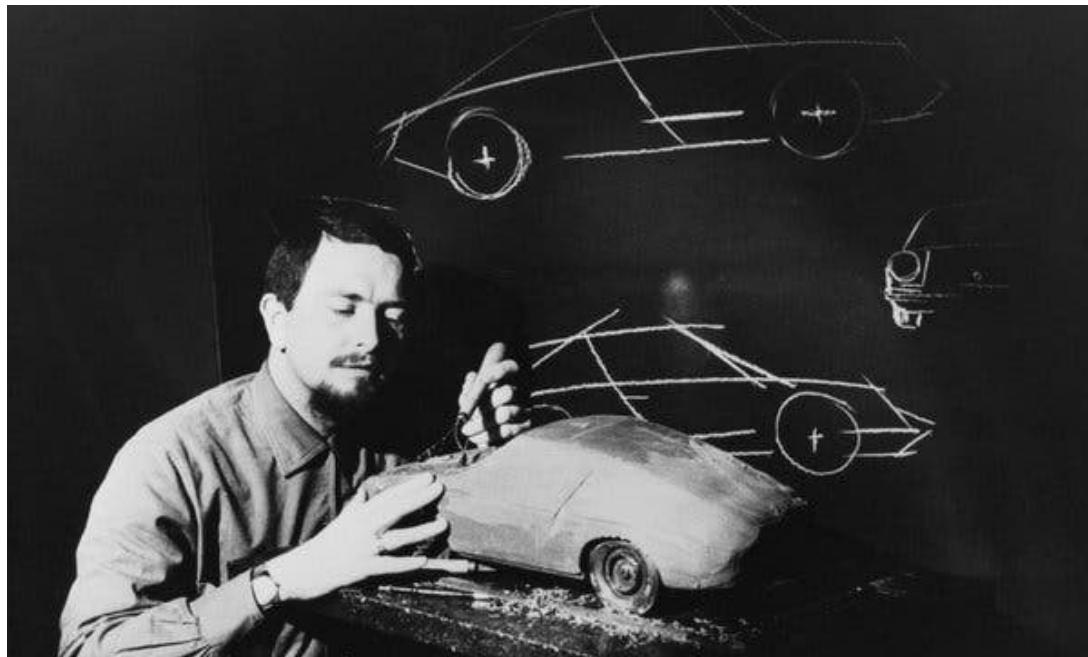
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Analogy



Ferdinand Porsche
Car Designer Genius



Lewis Hamilton
7-times F1 Champion



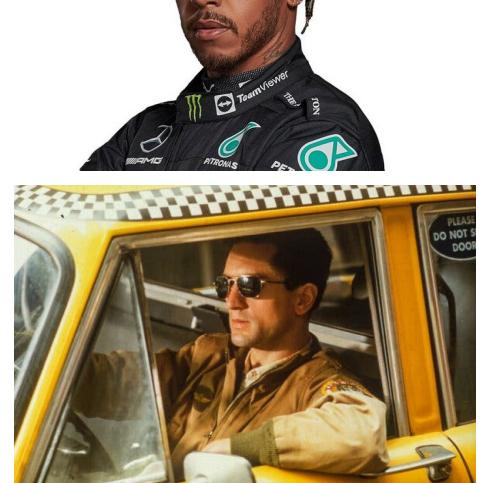
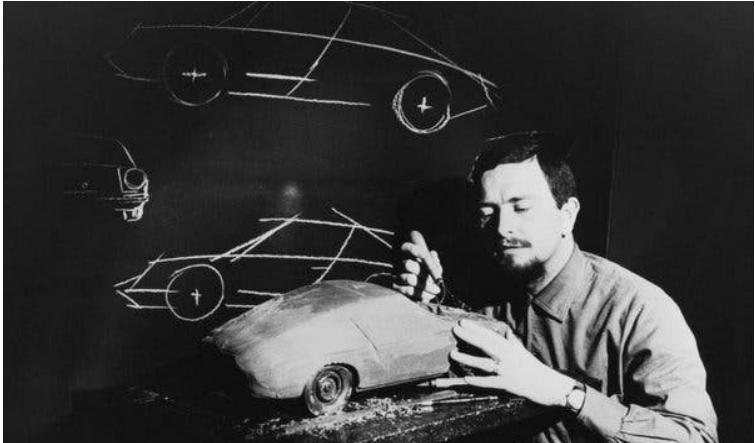
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Role Specialisation



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„Computer Expert”



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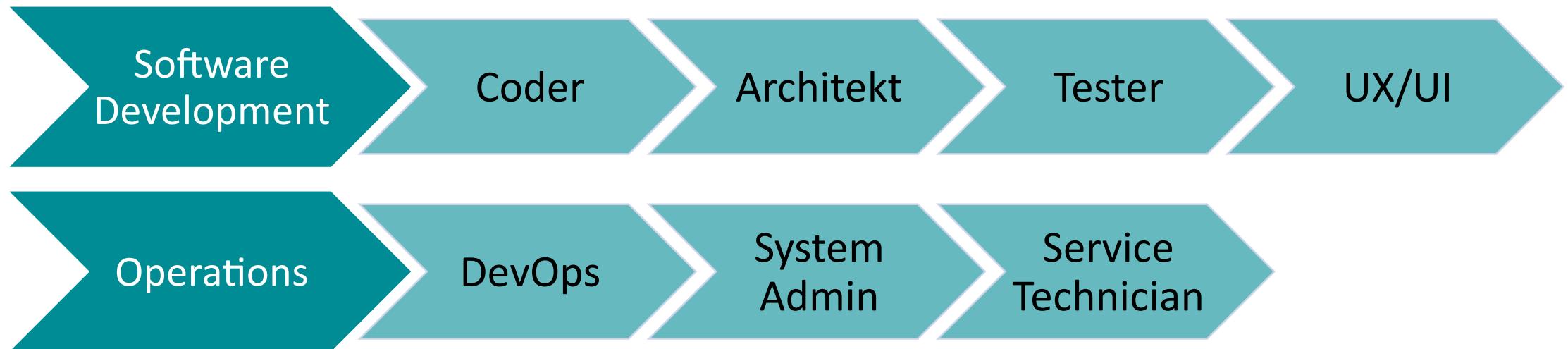
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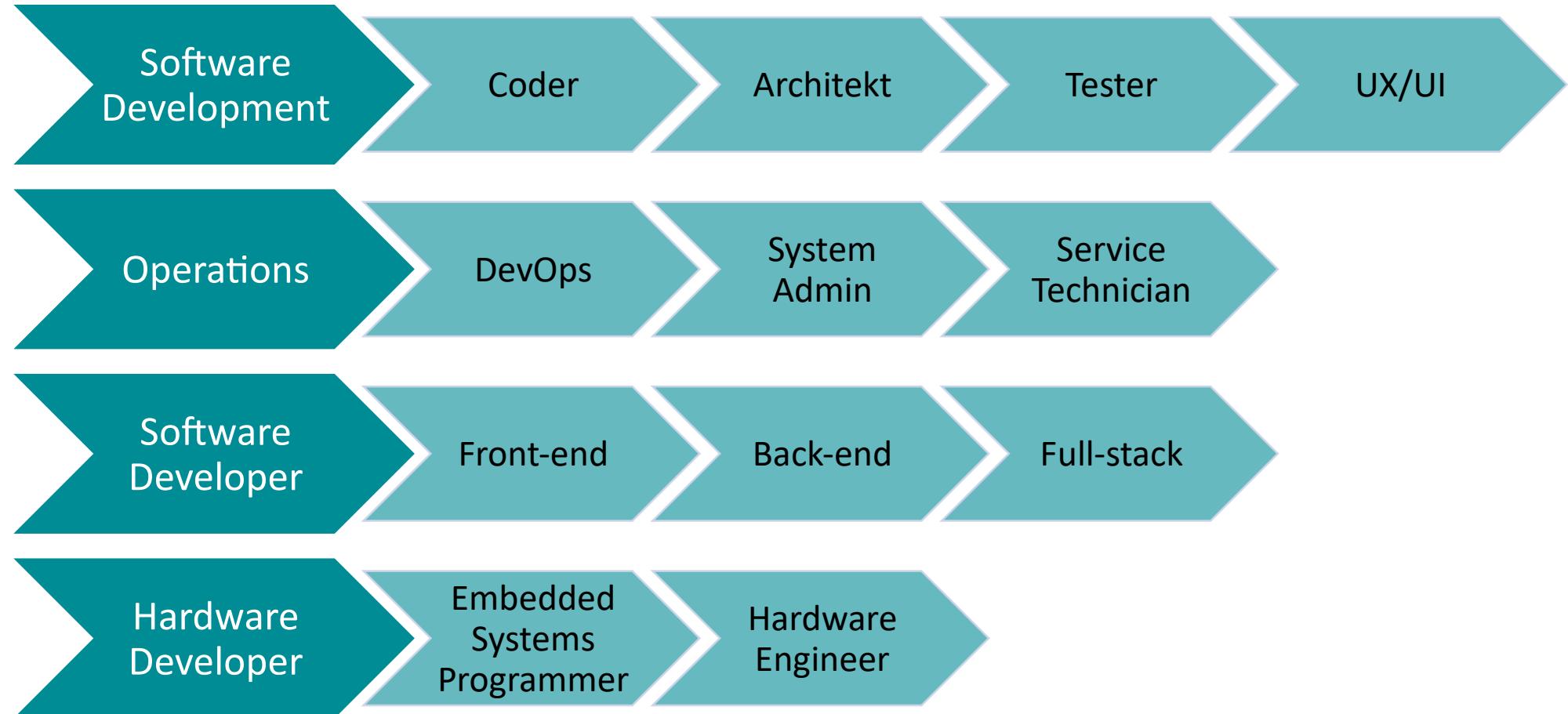
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„Computer Expert”



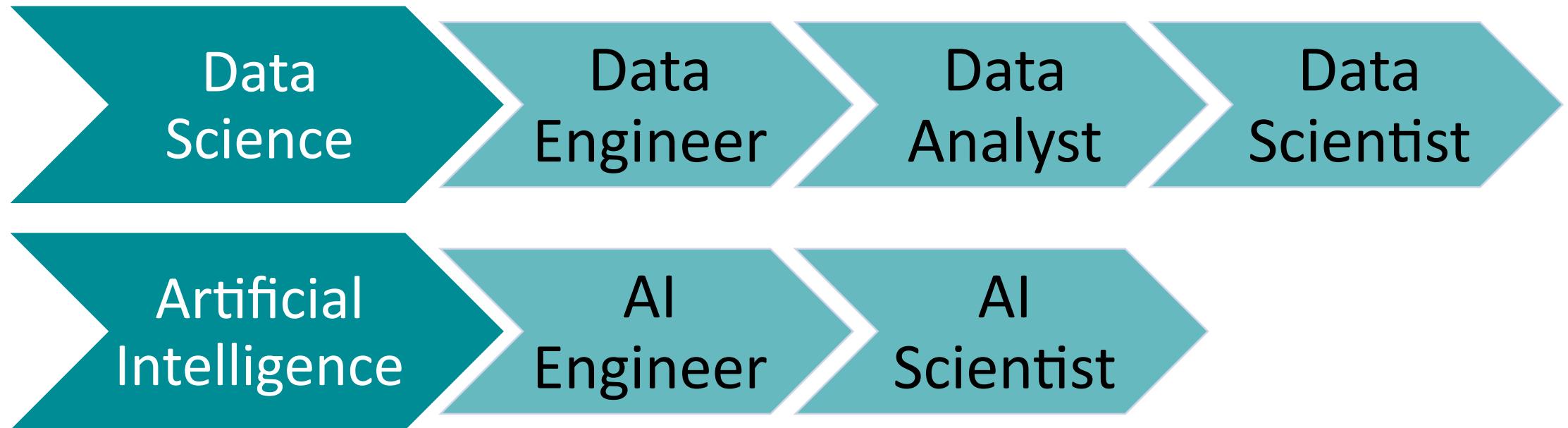
„Computer Expert”



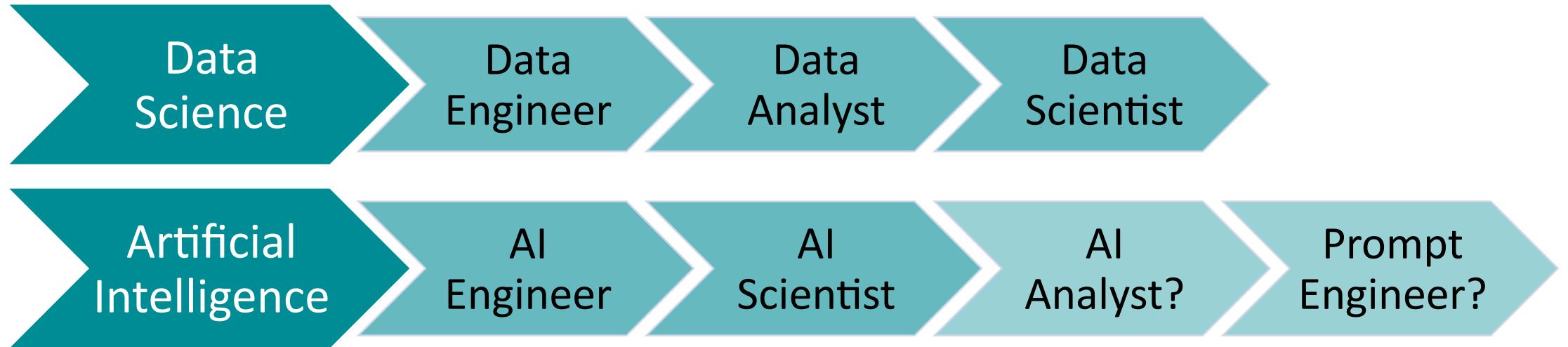
Role Specialisation



Role Specialisation



Role Specialisation

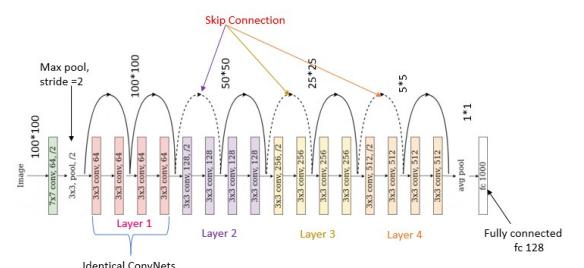
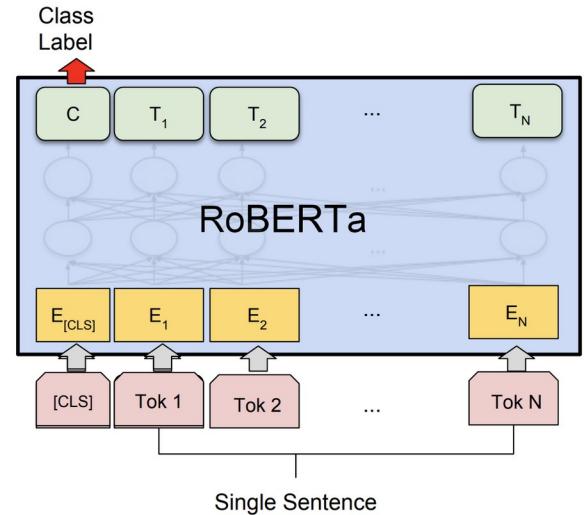
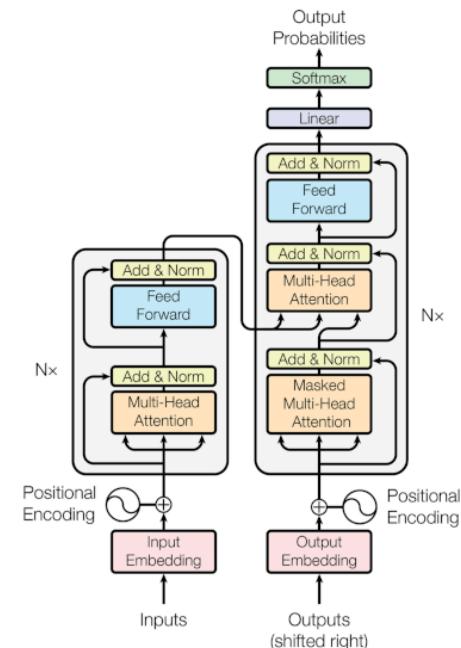


Background



- **De facto standard model architectures**
 - C.f. Classic Algorithms
 - C.f. Design Patterns
- **Transfer Learning**
 - Downloadable pre-trained models (ResNet-18, YOLOv8, etc.)
- **Starting from scratch is rare**
 - Rapidly growing 'library'
 - Best practices to be applied

Background



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Specialisation



Role



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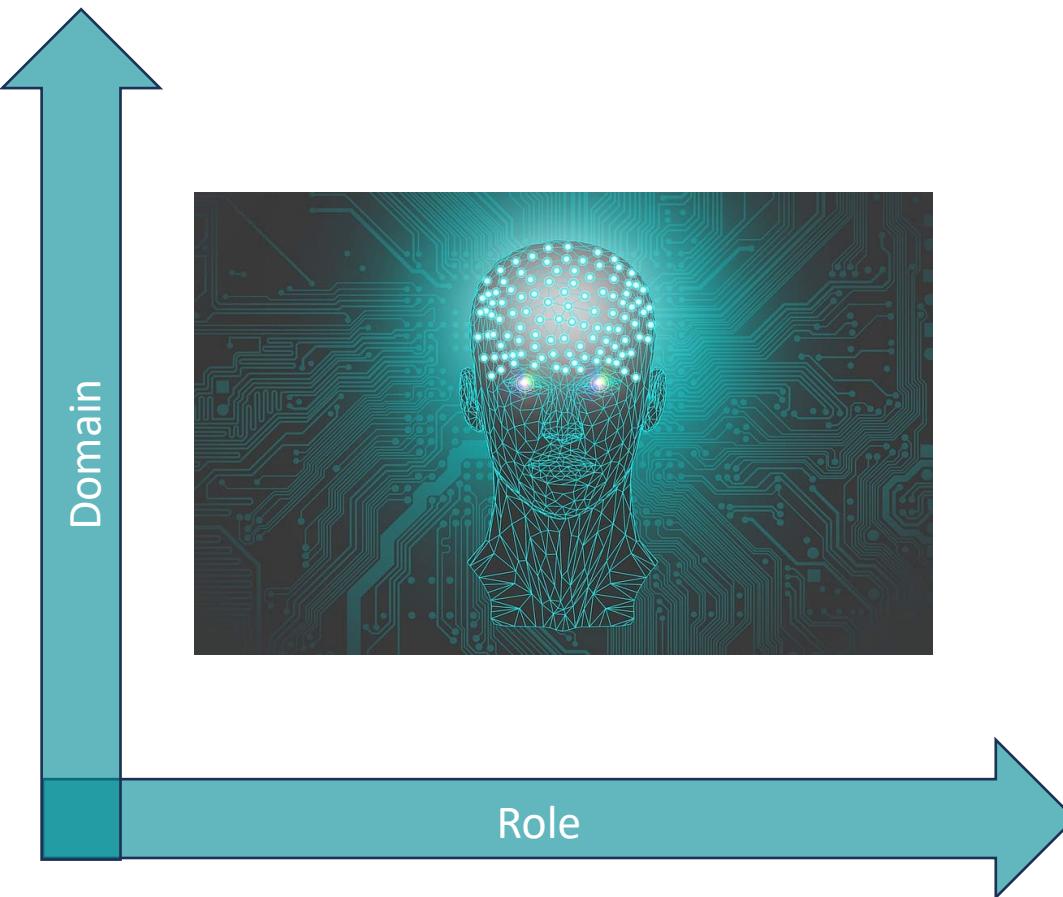
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Specialisation



Domain

Data (general)

MLP

RBM

Autoencoders

Image, Video: classification

CNN: AlexNet, VGG16, GoogLeNet

DenseNet, MobileNet, Resnet-18, ZfNet, FractalNet

WideResNet, PyramidalNet, Residual Attention Net, EfficientNet

Image, Video: advanced

Object detection

- R-CNN, Fast R-CNN, Faster R-CNN, YOLOvX

Instance Segmentation

- Mask R-CNN, Keypoint R-CNN, SAM, SEEM

Pose Estimation

- OpenPose, MediaPipe, MeTRAbs

3D modelling

- NERF
- PointNet

Time Series

RNN

LSTM

GRU

Attention mechanism

Natural Language Processing

Transformers, Attention mechanism

BERT, RoBERTa, HUBERT, DistilBERT, XLNet

Large Language Models

- ChatGPT-x, LLAMA, PaLM2, PULI

Graphs

GNN, GCN, GAT

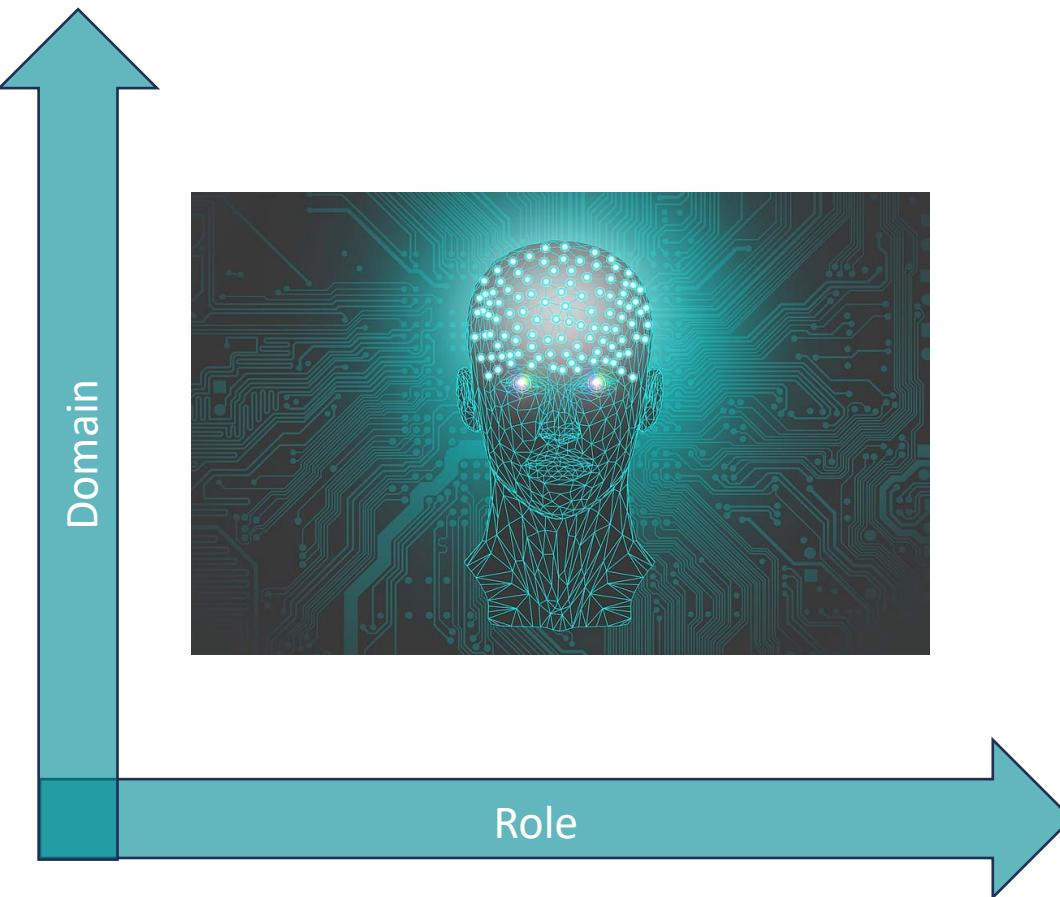
FastGCN, GraphSAGE

AGCN, GGP, DCN, DGCN

GGNN, Graph LSTM



Specialisation



Implications

Specialisation

Diversified expectations at workplace

Specialised education

AI Engineer
AI Designer

New Requirements

Testing
Proof of Correctness
Explainable Models





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Thank you!

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