

Kunstig intelligens

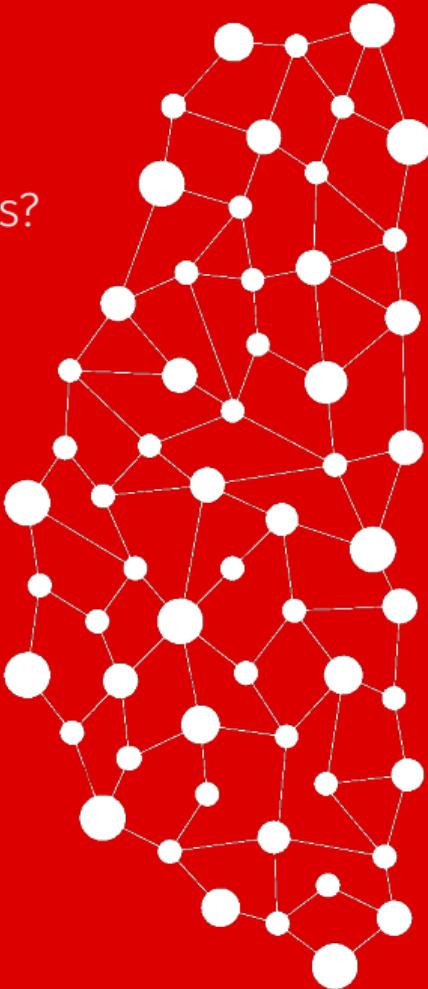
Hva er det, og hvilke muligheter åpnes?



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Universitet i Oslo

Chief Scientific Officer, baba.vision



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1. Kunstig intelligens
 - Historikk, definisjoner, terminologi
2. Hvilke muligheter åpnes?
3. Praktiske erfaringer



Kunstig intelligens



Kunstig intelligens



Alan Turing



Kunstig intelligens

M I N D
A QUARTERLY REVIEW
OF
PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND
INTELLIGENCE

By A. M. TURING

1. *The Imitation Game.*

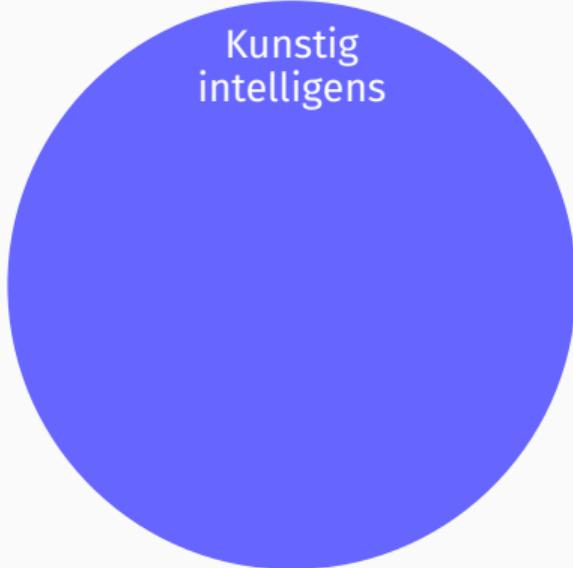
I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.



Kunstig intelligens

Teknologi som løser oppgaver som
krever en eller annen form for
menneskelig intelligens

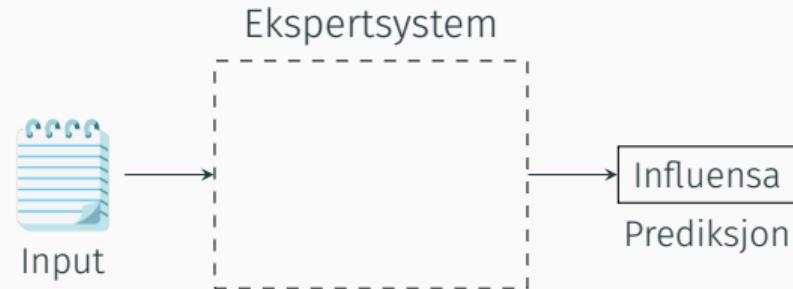




Kunstig
intelligens

Et fagfelt som produserer teknologi
som løser oppgaver som krever en eller
annen form for menneskelig intelligens







Input

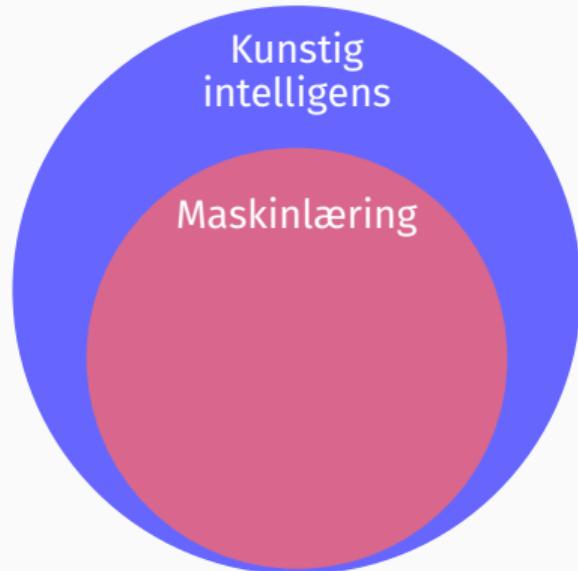
Ekspertsystem

Har feber
Hoster
Sår hals

Influensa
Prediksjon

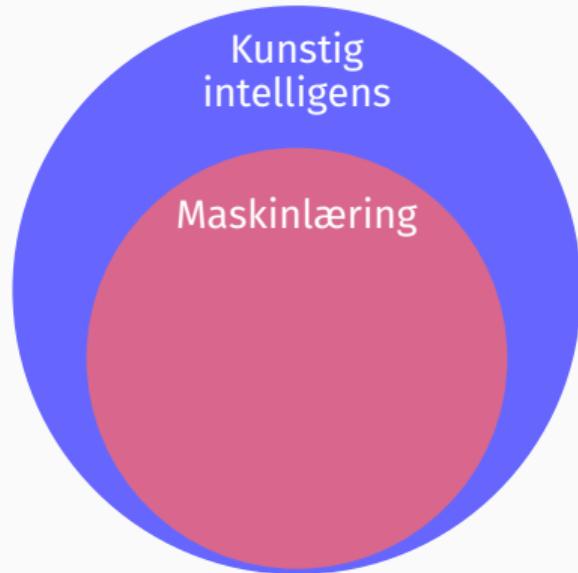


Kunstig intelligens



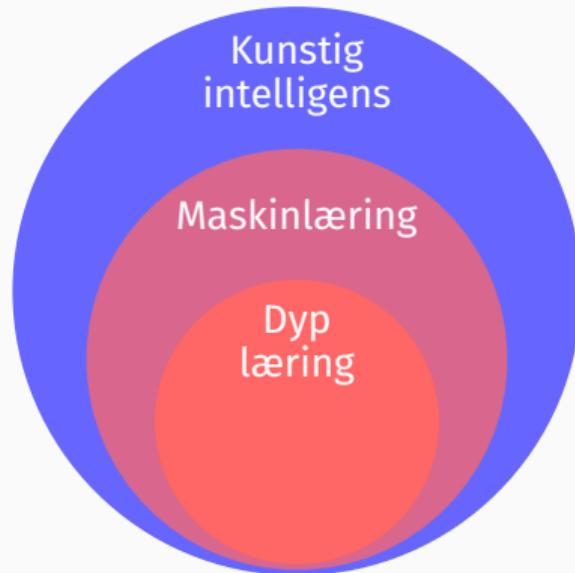




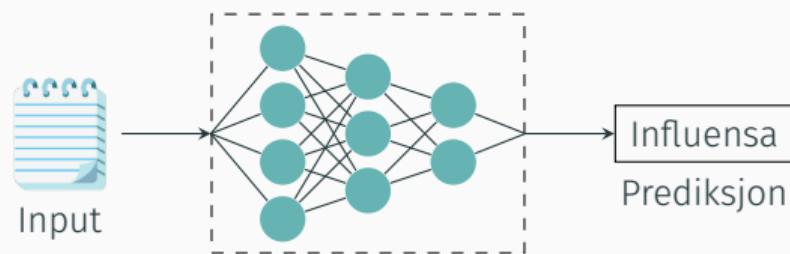


Teknologi som lærer seg å løse
oppgaver ved å finne
mønstre i treningsdata

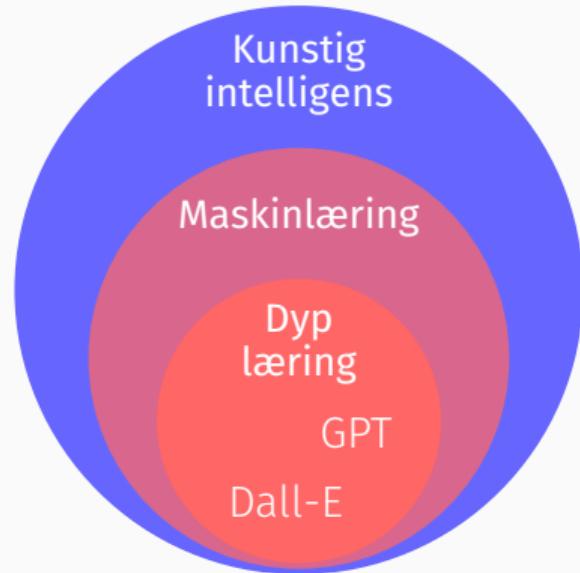




Kunstig nevralgt nettverk



Kunstig intelligens



Kunstige nevrale nettverk som lærer komplekse sammenhenger mellom input og output



Terminologi



Katt



Hund

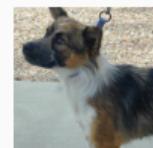


Katt

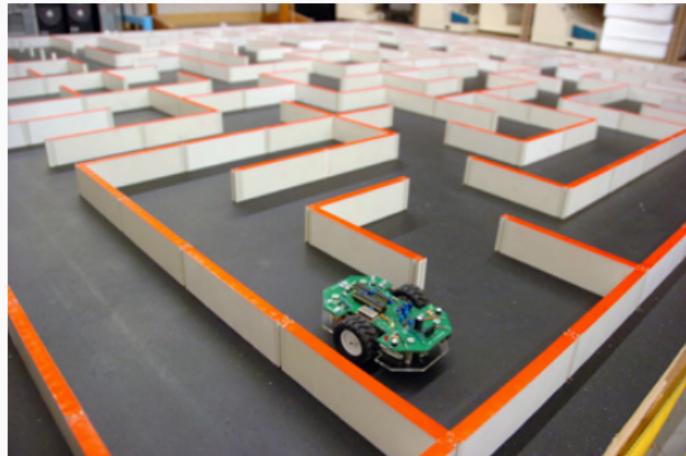


Hund

Veiledet
Ikke-veiledet



Terminologi



Forsterkende læring



Terminologi



Generativ kunstig intelligens



Terminologi

Smal (svak)

Generell (sterk)

I stand til å løse et større spekter
problemer innen flere ulike domener

Mer spesifikk

Mer generell



Terminologi

Smal (svak)

Generell (sterk)

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Mer spesifikk



Mer generell

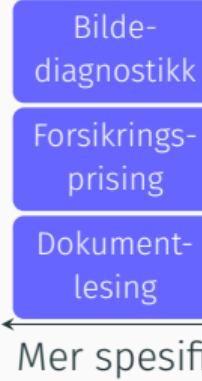


Terminologi

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Mer spesifikk

Mer generell

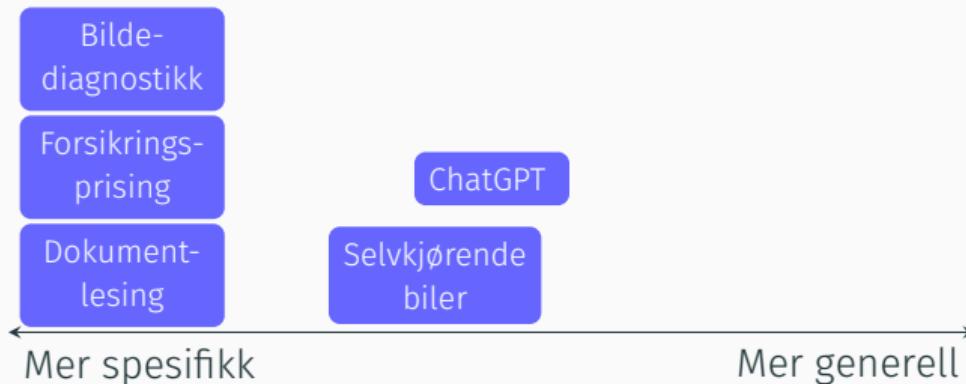


Terminologi

Smal (svak)

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Mulighetsrom



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Mulighetsrom



Utforskende



Automatiserende



Egenutvikling

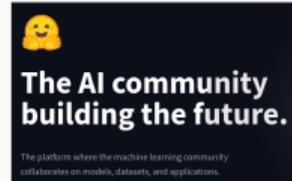
```
import numpy as np
import json
import os
import re
import random as rd
import numpy as np
import tensorflow as tf
import tensorflow as tf
from tensorflow import constant
from tensorflow import reduce_mean
from typing import Any, Callable, Dict, List, Tuple
from fit.model import fit_model
from fit.loss import loss_fn
from fit.optimizer import Optimizer, Adam, SGD
from fit import parameters, art_loss, regularizer
from fit import metrics
from fit import logging, hooks
logger = logging.getLogger('main') -> tensorflow/tensorflow
logger + logging.getLogger('tf') -> tensorflow/tensorflow
def _numerical_hypoparameter(key: str, arg1: Any) -> Optimizer, Any:
    key = hypoparameter[key]
    value = None if not isinstance(hypoparameter[key], dict) else [
        value[hypoparameter[key]] for key in hypoparameter[key]
    ]
```



Egenutvikling

```
import numpy as np
import json
import os
import re
import random as rd
import tensorflow as tf
import tensorflow_hub as hub
from typing import Any, Callable, Dict, List, Tuple
from abc import ABC, abstractmethod
from typing import Any, Callable, Dict, List, Tuple
from fit.model import FitModel
from fit.optimizer import Optimizer, Adam, GradientDescent, SGD
from fit.loss import Loss, CrossEntropyLoss, MSELoss, SigmoidCrossEntropyLoss
from fit.metrics import Metric, Accuracy, F1Score, Precision, Recall
from fit.validation import Validation
from fit.callbacks import Callback, EarlyStopping, ModelCheckpoint, TensorBoard
logger = logging.getLogger('fit')
logger.setLevel(logging.INFO)
logger.info('TensorFlow version: %s' % tf.__version__)
logger.info('TensorFlow Hub version: %s' % hub.__version__)
def _hyperparameter(key: str, type: Any) -> Hyperparameter:
    hyperparameter = Hyperparameter(key)
    hyperparameter.type = type
    return hyperparameter
```

Åpne modeller



Erfaringer

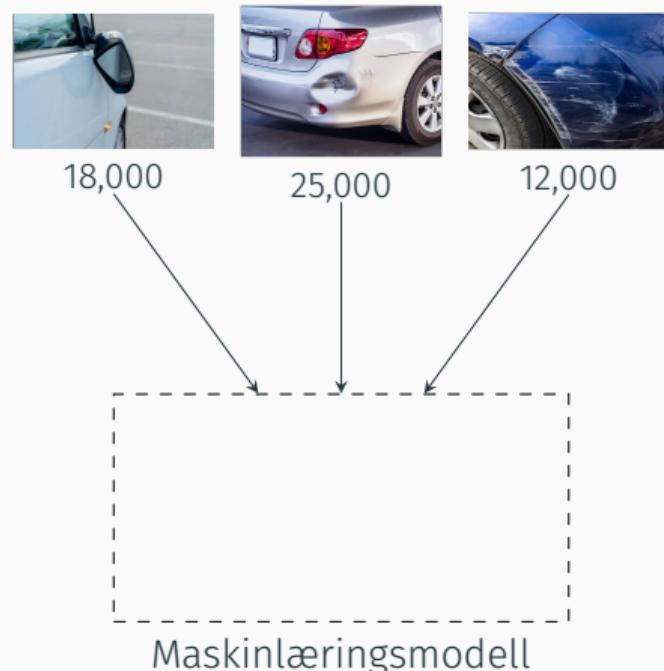


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Erfaringer: Bilskade



Erfaringer: Bilskade



Erfaringer: Bilskade



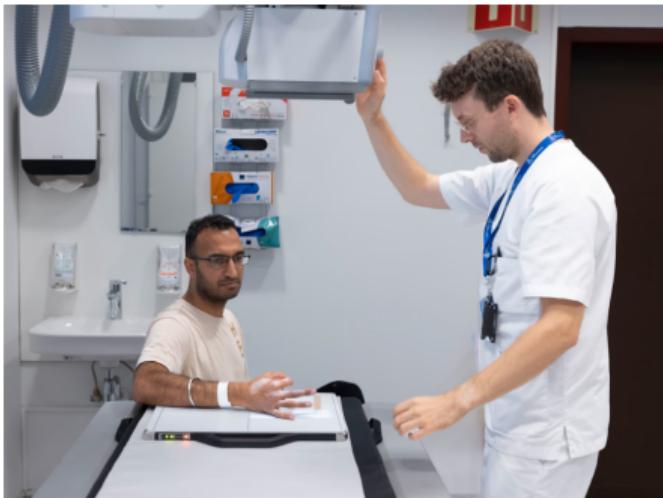
Erfaringer: Bilskade



Sørg for at data som kommer inn når systemet er satt i produksjon matcher treningsdataen!

- Vurder om brukere trenger opplæring
- Legg inn gode instruksjoner i sluttbrukerapplikasjonen





RØNTGEN: Radiograf Jonas Vatne plasserer røntgenmaskinen over hånden til Davide Bhuller (41). Formålet er å finne ut om han har brukket hånden. Foto: Jonna Matter-Hansen / VG

Fikk hånden analysert av kunstig intelligens: – Resultatet kom så raskt

Erfaringer: Radiologi



Sørg for at systemet som helhet tolererer at prediksjonsmodellen tar feil!

- Tving modellen til å uttrykke usikkerhet
- Bruk menneskelige eksperter som et sikkerhetsnett



Erfaringer: Bildeanalyse



Kunstig intelligens

Hva er det, og hvilke muligheter åpnes?

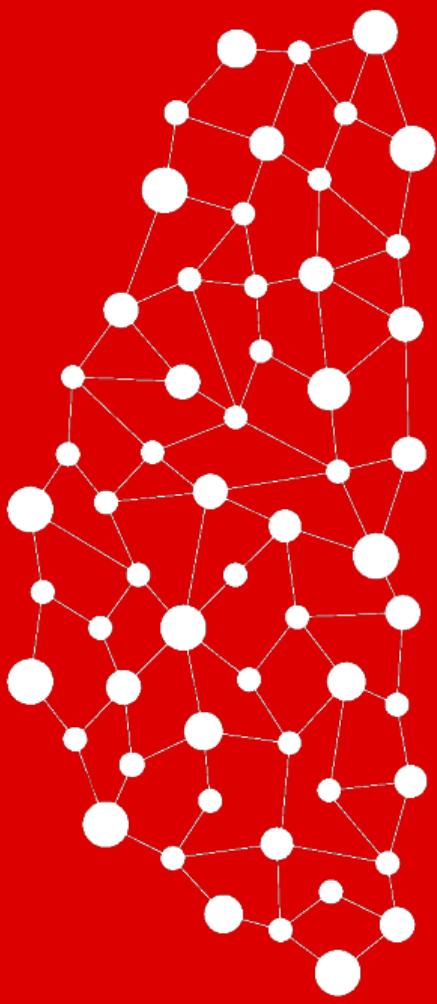


Bruk menneskelige eksperter i utviklingsarbeidet!

- Sørg for at modellen har tilgang til tilstrekkelig informasjon



Takk for oppmerksomheten!
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