How Machine Learning is Helping Different Fields

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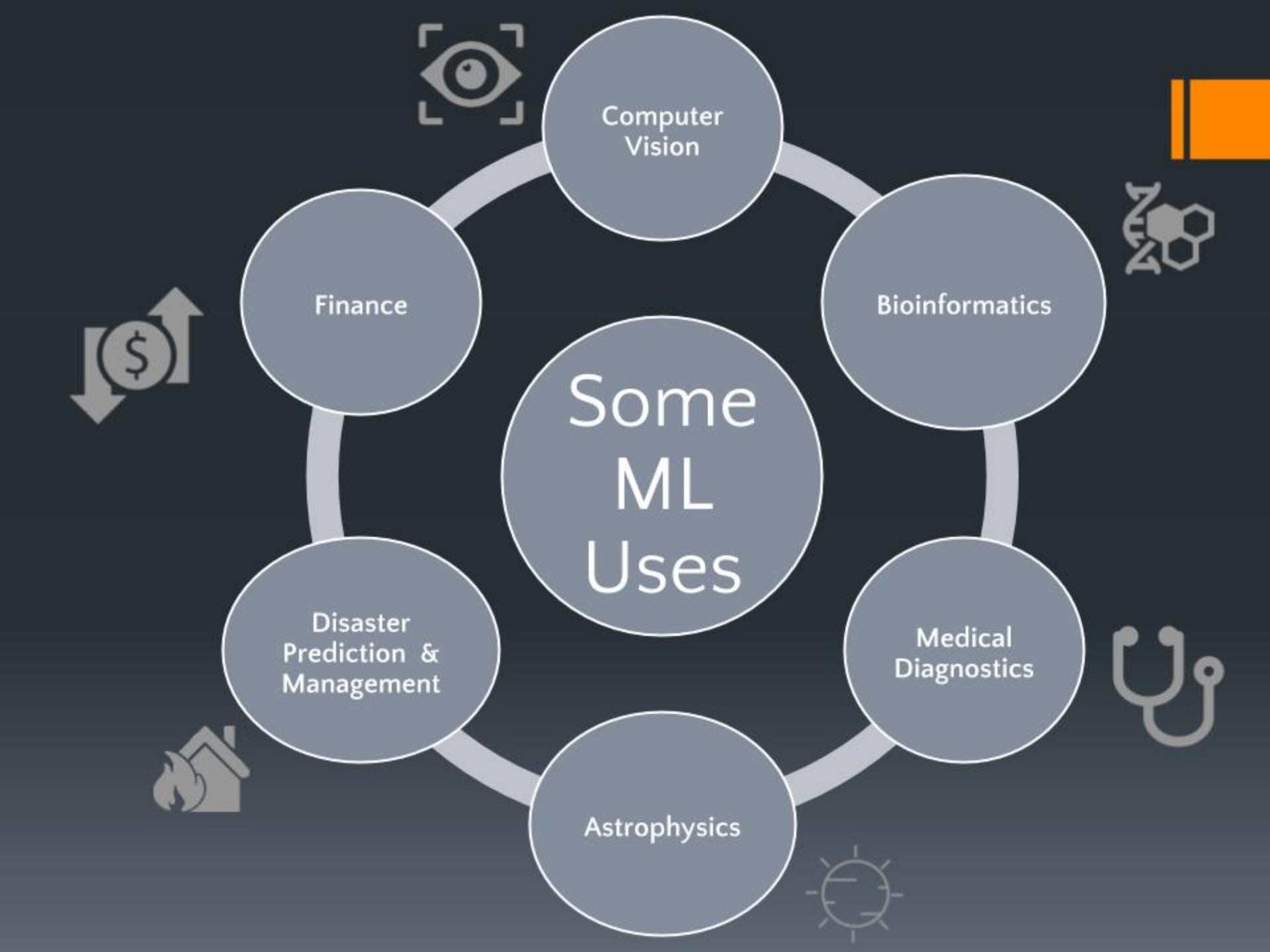
It's in your daily lives

- YouTube and Amazon recommendations
- Voice assistants like Siri, Alexa and Cortana
- Spam mail filtering
- Search results

Image credits – Scott Adams


Some ML Uses
Computer Vision
Bioinformatics
Medical Diagnostics
Astrophysics
Disaster Prediction & Management
Finance

My experience with ML

- Astrophysics
- Denoising Gravitational waves
- Gravitational waves detected at the Laser Interferometer Gravitational-Wave Observatory (**LIGO**) detectors
- Problem is, waves are very weak

What we did

- Used Recurrent Neural Networks (RNNs) and Long Short Term Memory (LSTM) cells
- Applications in Machine translation and removing noise from sound waves
- For implementation, used a Python library called Keras (with tensorflow backend)

What are RNNs?

- Normal Neural Networks allow for fixed sized inputs
- What if my input is not fixed size / sequential input?
- Multiple neural networks?
- Hooray for RNNs!
- Essentially, they can be seen as multiple copies of the same network
- Output depends on all inputs given till now

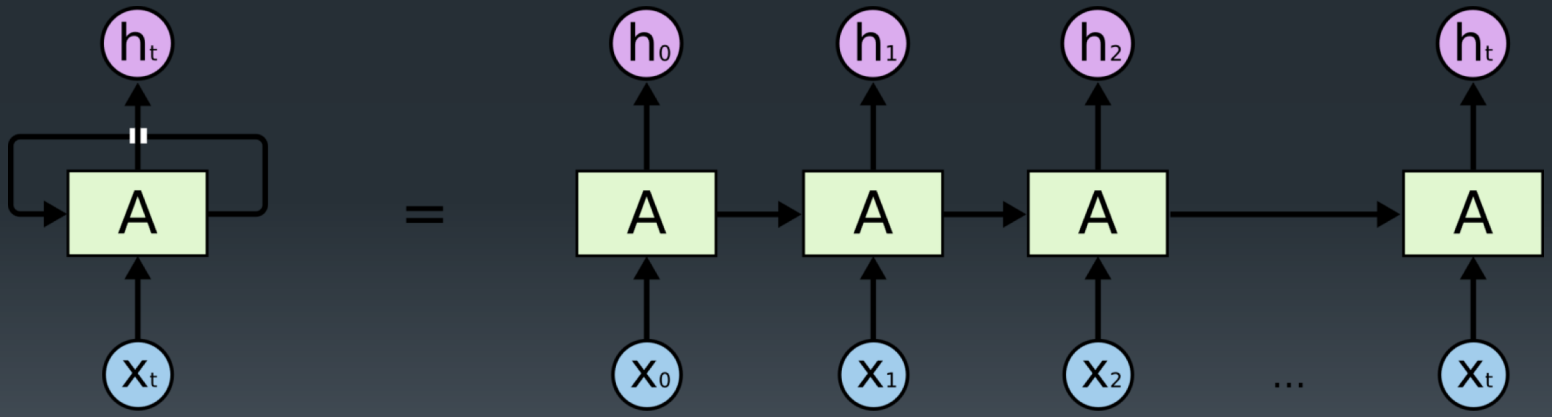


Image credits – Colah

Won’t RNNs solve all problems then?

- Sadly, no.
- In practice, effectiveness of RNNs go down with long term dependencies
- LSTMs save the day
- Special types of RNNs which can handle long term dependecies

Why did I specify Keras?

```
encoder_inputs = Input(shape=(None,look_back))
encoder = LSTM(latent_dim, return_state=True, return_sequences=True)
encoder_outputs, state_h, state_c = encoder(encoder_inputs)
states = [state_h, state_c]

decoder_inputs = Input(shape=(1, 1))
decoder_lstm = LSTM(latent_dim, return_sequences=True, return_state=True)
decoder_dense = TimeDistributed(Dense(1))
```

Thank You !
Gracias !
Merci !
Grazie !
Khop Khun Mak Kha !
Spasiba !
Takk !
Mahalo !
ありがとう！
감사합니다 !