

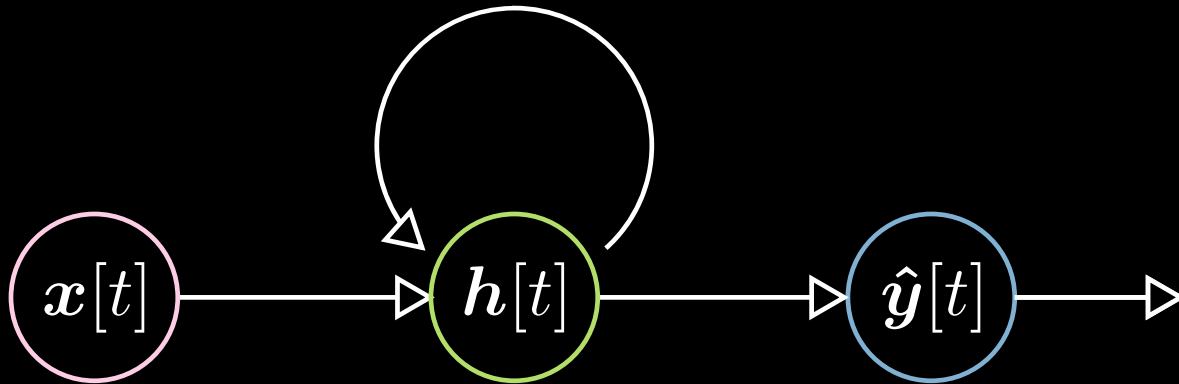
Practical 4.0

Recurrent Neural Networks – Vectors and sequences

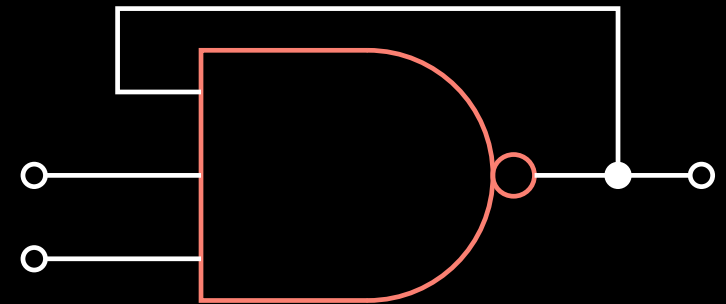
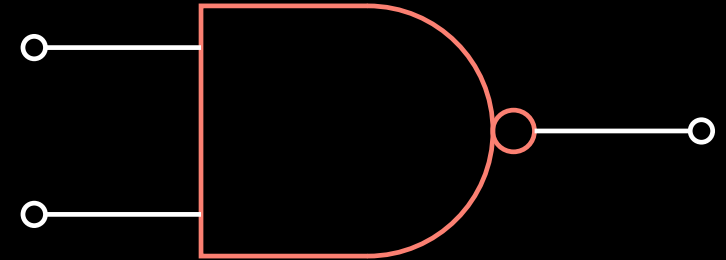
Overview (I)

- Vanilla and Recurrent Neural Networks
- Combinations and applications
 - Vector \rightarrow vector
 - Vector \rightarrow sequence
 - Sequence \rightarrow vector
 - Sequence \rightarrow vector \rightarrow sequence
 - Sequence \rightarrow sequence

Vanilla and Recurrent NN



Combinatorial logic



Sequential logic

Rationale

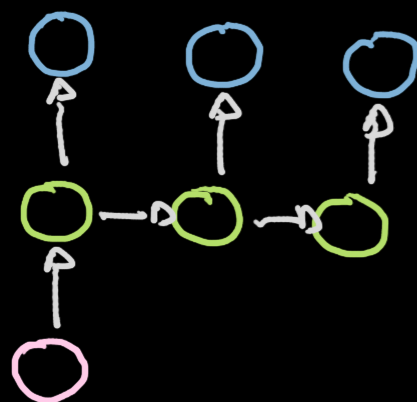
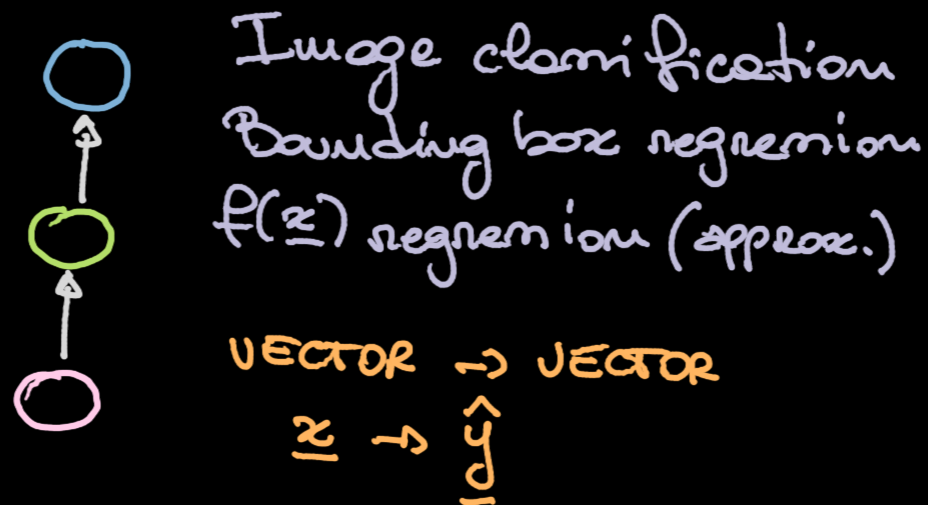
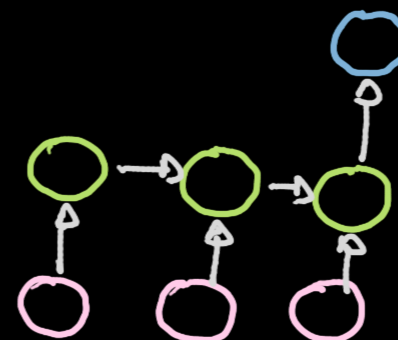
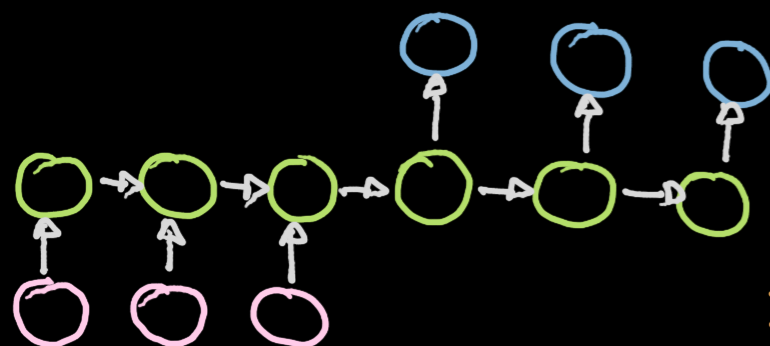


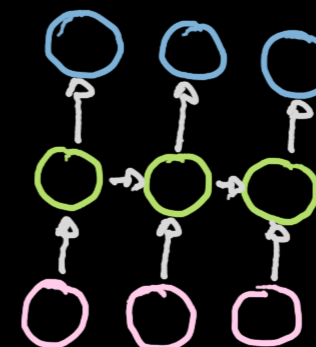
Image captioning
VECTOR \rightarrow SEQUENCE
 $\underline{x} \rightarrow \hat{\underline{y}}[t]$



Equation solver
Program executor
SEQUENCE \rightarrow VECTOR
 $\underline{x}[t] \rightarrow \hat{\underline{y}}[T]$

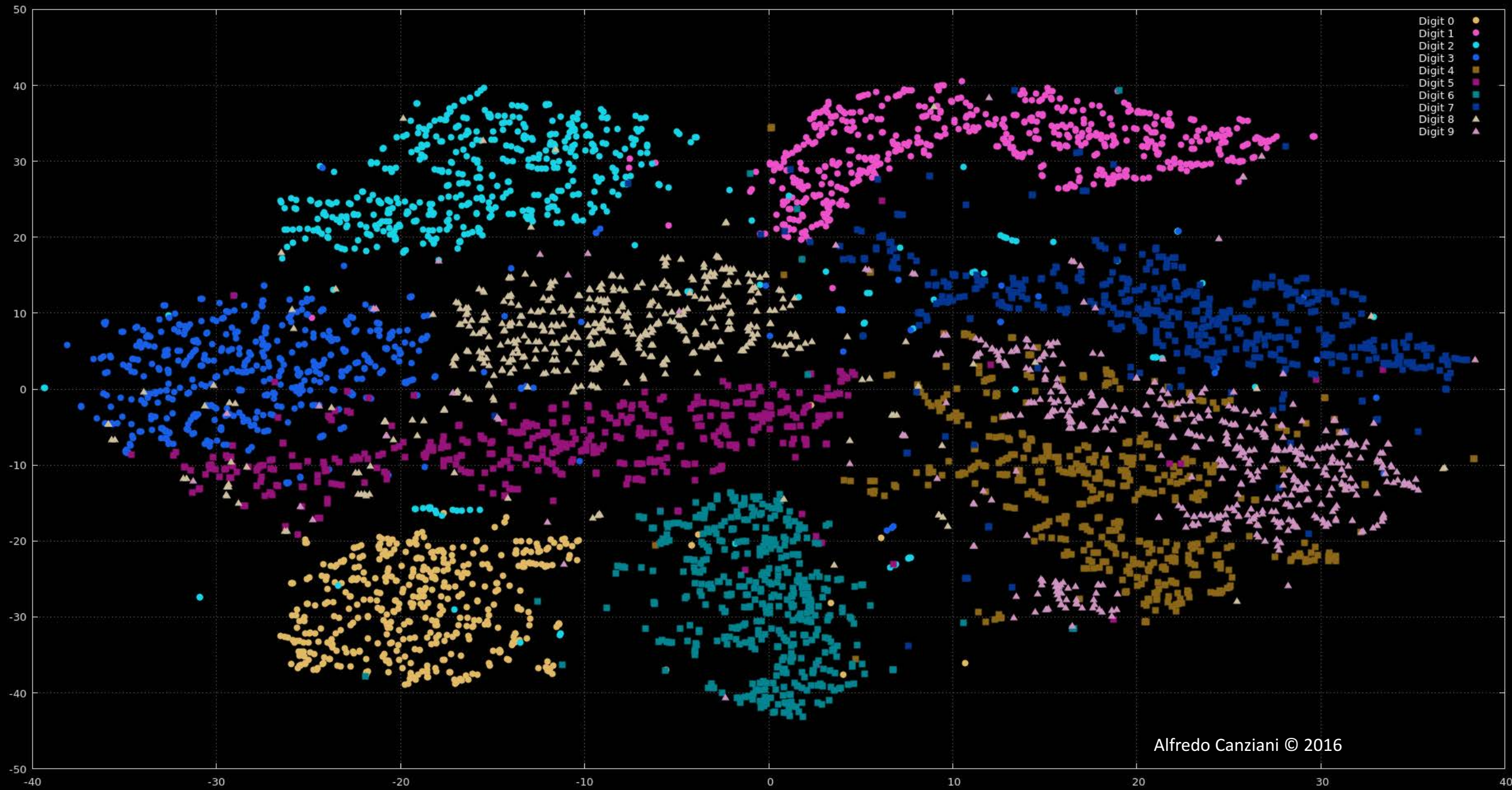


NMT
Neural Machine Translation
SEQ \rightarrow VEC \rightarrow SEQ
 $\underline{x}[t] \rightarrow \underline{h} \rightarrow \hat{\underline{y}}[t]$

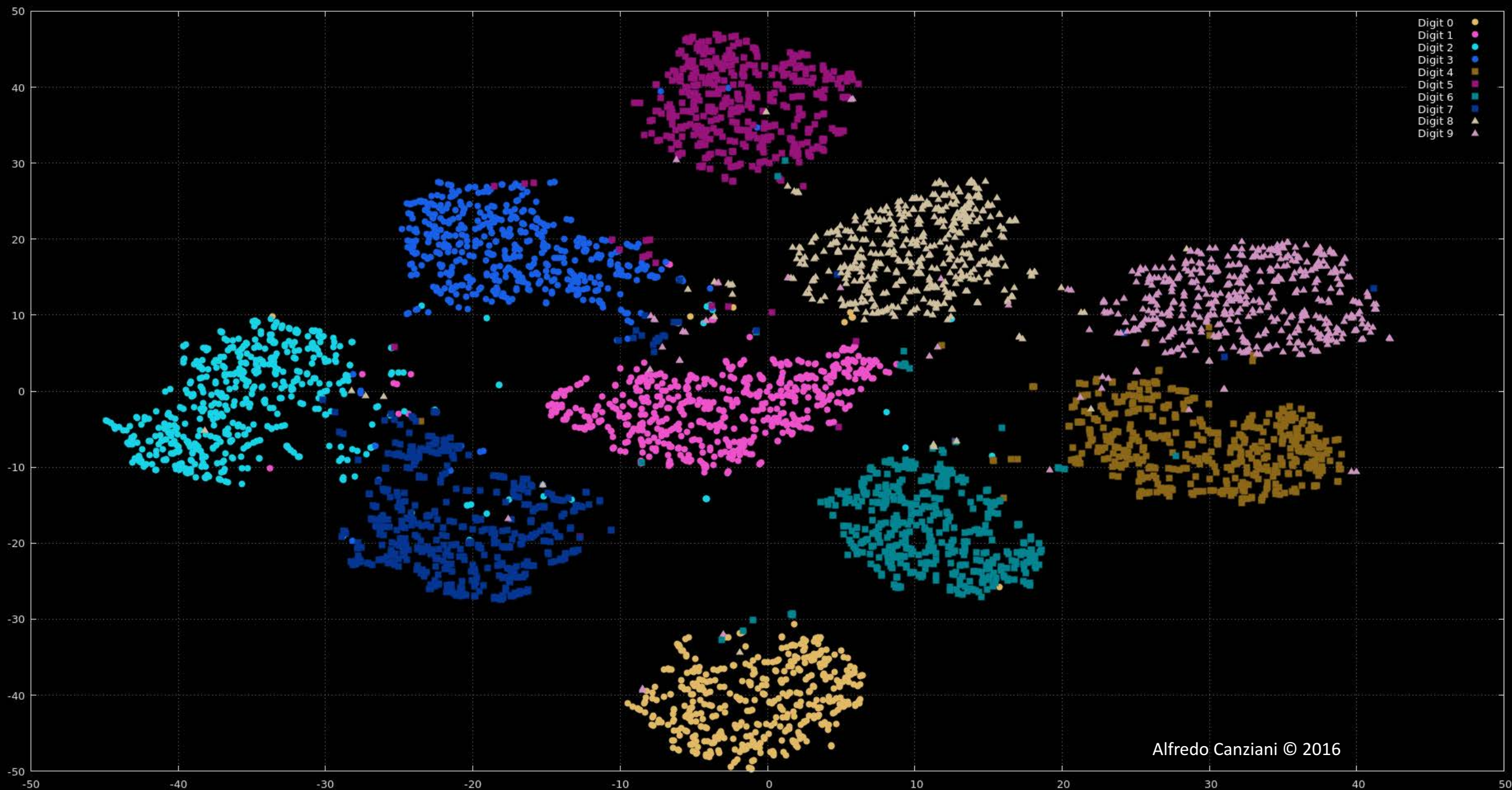


T9 / Auto completion
SEQUENCE \rightarrow SEQUENCE
 $\underline{x}[t] \rightarrow \hat{\underline{y}}[t]$

Barnes-Hut t-SNE



Barnes-Hut t-SNE



A person riding a motorcycle on a dirt road.



Two dogs play in the grass.



A skateboarder does a trick on a ramp.



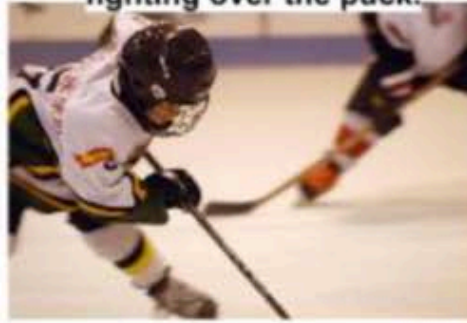
A dog is jumping to catch a frisbee.



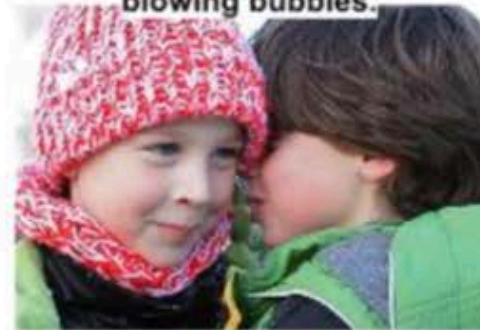
A group of young people playing a game of frisbee.



Two hockey players are fighting over the puck.



A little girl in a pink hat is blowing bubbles.



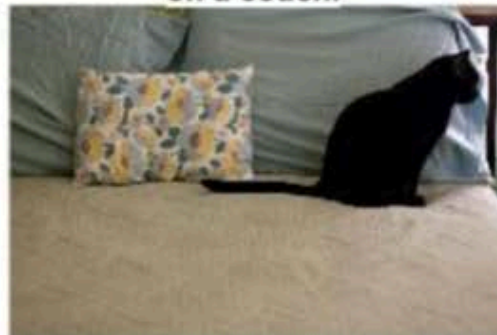
A refrigerator filled with lots of food and drinks.



A herd of elephants walking across a dry grass field.



A close up of a cat laying on a couch.



A red motorcycle parked on the side of the road.



A yellow school bus parked in a parking lot.



Describes without errors

Describes with minor errors

Somewhat related to the image

Unrelated to the image

Learning to execute

- Input:

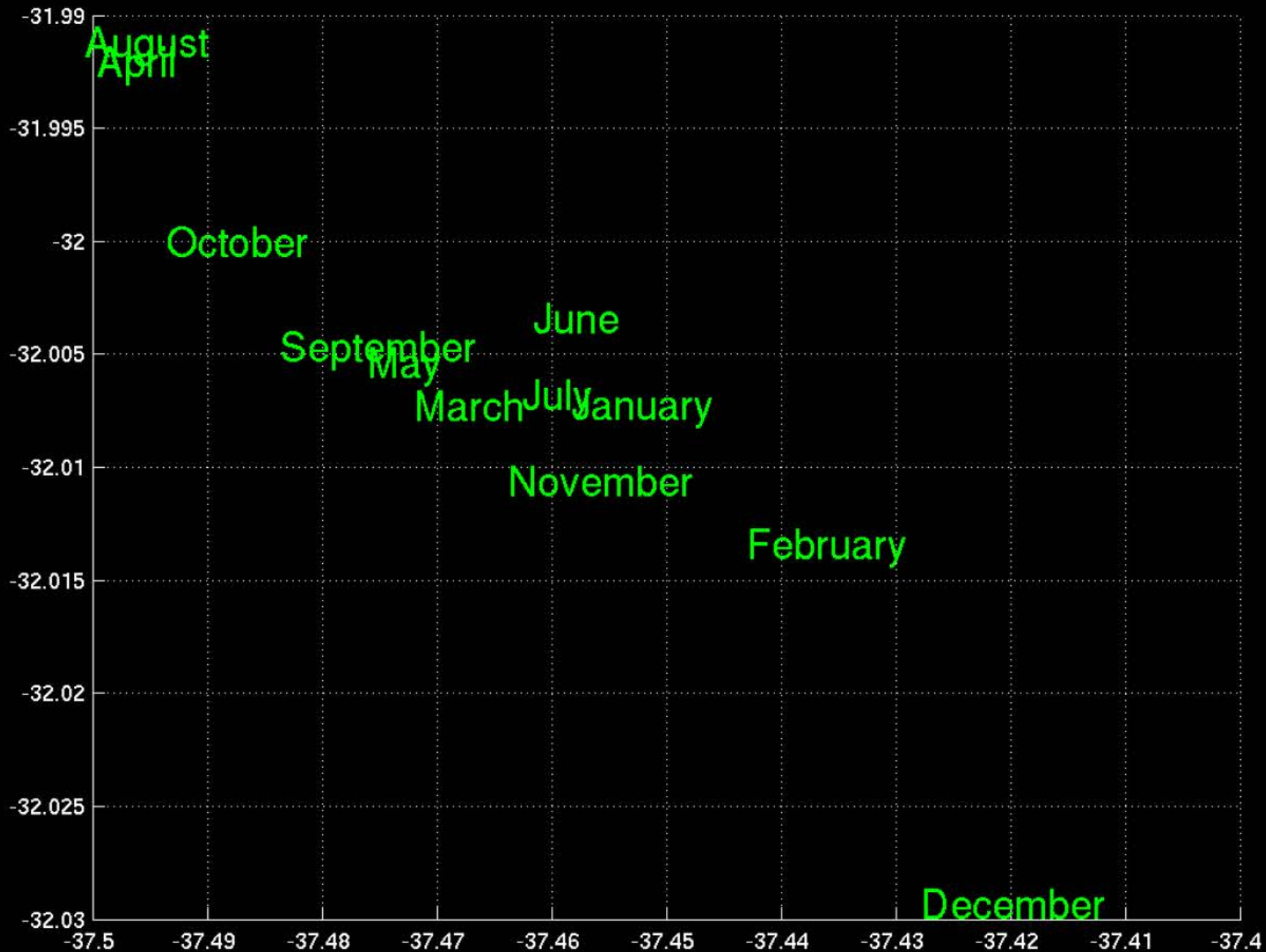
```
j=8584
for x in range(8):
    j+=920
b=(1500+j)
print((b+7567))
```

- Target: 25011.

- Input:

```
i=8827
c=(i-5347)
print((c+8704) if
2641<8500 else 5308)
```

- Target: 12184.



The image shows a code editor interface with two tabs at the top: 'test.txt' and 'rnn-client.coffee'. The 'test.txt' tab is selected and active. Inside the editor, the first line of code is '1 The', where '1' is a line number and 'The' is the text being edited. A blue vertical cursor is positioned at the end of the word 'The'.