

Deep Learning for Natural Language Processing

Introduction to Generation Tasks



UNIVERSITY OF
GOTHENBURG

CHALMERS

WASP | WALLENBERG AI
AUTONOMOUS SYSTEMS
AND SOFTWARE PROGRAM

Richard Johansson

richard.johansson@gu.se

this module: generation tasks

- ▶ our remaining lectures will be focused on **generation** tasks
- ▶ translation, summarization, image captioning, ...
- ▶ we'll start with an introduction to this type of task



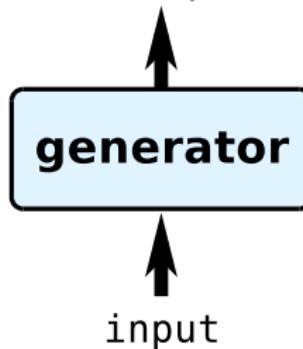
A person riding a motorcycle on a dirt road.



definition

- ▶ **conditional** generation: given an input, generate a text

Stockholm is the capital of Sweden.



- ▶ the input can be of different types

machine translation

translator

machine translation

translator



Stockholm är Sveriges huvudstad.

machine translation

Stockholm is the capital of Sweden.

translator

Stockholm är Sveriges huvudstad.

summarization, headline generation

Summary: *A man and a child have been killed after a light aircraft made an emergency landing on a beach in Portugal.*

Document: Authorities said the incident took place on Sao Joao beach in Caparica, south-west of Lisbon.

The National Maritime Authority said a middle-aged man and a young girl died after they were unable to avoid the plane.

The plane's only two occupants were unharmed, it added.

The Diario de Noticias newspaper quoted an eyewitness who said the plane had been flying at a low altitude over the beach, although he did not realise anything was wrong until other beachgoers began running.

One young witness told Reuters news agency: "I was near the water when I saw the plane. I called my parents, the plane fell on the sand and ran over two people, fatally hurting them and another was injured, I think, but I'm not sure, people were running away."

"The plane is still there, but the ambulances arrived quickly. I think maybe the fuel ran out because I find it weird that it landed on the beach."

Other reports said the victims had been sunbathing when the plane made its emergency landing. The Associated Press news agency said the girl who died had been with her parents, who were unhurt. The agency quoted witnesses from local television broadcasts.

Joao Quadros, who was on the beach, tweeted photos of the aftermath, saying the plane had passed by his son by a matter of metres. There had been no noise, he said.

Video footage from the scene carried by local broadcasters showed a small recreational plane parked on the sand, apparently intact and surrounded by beachgoers and emergency workers. One wing seemed to be misaligned in those photos.

The cause of the emergency landing remains unclear.

example by Narayan et al. (2019)



normalization and error correction

- ▶ historical → modern
- ▶ unstandardized → standardized
- ▶ ungrammatical → grammatical

Some normalization examples

DE _A	defe wort spricht vnfer liber here ihesus criftus czu cyme iczlychen menschen diese wort spricht unser lieber herr jesus christus zu einem ieteslichen menschen
DE _B	feind fy doch alle aufz den vier elementen gemischet vnd eins feuchter deñ das ander sind sie doch alle aus den vier elementen gemischt und eins feuchter denn das andere
EN	whan your graciouse erthely persoune from your inward spirit ys dessolued when your gracious earthly person from your inward spirit is dissolved
ES	anke tomeys mui mucho travajo tengola guardada pa quando dios sea servido aunque tornéis muy mucho trabajo téngola guardada para cuando dios sea servido
HU	o zauoc éfsméig felémélue kézdén̄ firfioc élmén̄ec ézékét tolga ez a noemi azēt iugó ő szavuk ismét felemlvén kezdének siriuk elmenjek ezeket toldja ez a noémi azért jóve
IS	pá sem hanz gödverk voru i og pá vrdu hanns gödverk miklu þýngre enn ill þá sem hans góðverk voru í og þá urðu hans góðverk miklu þýngri en ill
PT	cō a poenetencia que lhe derão pera avisar aos snres do sancto oficio com a penitênciā que lhe deram para avisar aos senhores do santo oficio
SL _B	ter ne bodi neveren zhe se zherna perfí premozhi tezhe od nje rjav mòk ter ne bodi neveren če se črna prst premoči teče od nje rjav mok
SL _G	in privéže na vsak konec niti drobtino kruha in verže vse kokóšem breskevno vkuhanje lovre in priveže na vsak konec niti drobtino kruha in vrže vse kokóšim breskvino vkuhanje lovre
SV	blef av rätten afsagdt det en syn och rådgång nu nästkommande wårdagh hållas blev av rätten avsagt det en syn och rådgång nu nästkommande vårdag hållas

example by Bollmann et al. (2018)



email auto-responses

Query	Top generated responses
<p>Hi, I thought it would be great for us to sit down and chat. I am free Tuesday and Wednesday. Can you do either of those days?</p> <p>Thanks!</p> <p>-Alice</p>	<p>I can do Tuesday.</p> <p>I can do Wednesday.</p> <p>How about Tuesday?</p> <p>I can do Tuesday!</p> <p>I can do Tuesday. What time works for you?</p> <p>I can do Wednesday!</p> <p>I can do Tuesday or Wednesday.</p> <p>How about Wednesday?</p> <p>I can do Wednesday. What time works for you?</p> <p>I can do either.</p>

example by Kannan et al. (2016)

generation from a structure (“data-to-text”)

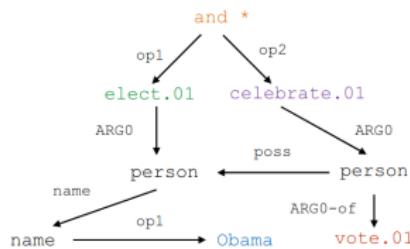
Stockholm is the capital of Sweden.

generator

capitalOf(Stockholm, Sweden)

generation from a structure: examples

Obama was elected and his voters celebrated



(Konstas et al., 2017)

name: The Golden Palace,
eatType: coffee shop,
food: Fast food,
priceRange: cheap,
customer rating: 5 out of 5,
area: riverside

MR

A coffee shop located on the riverside
called The Golden Palace,
has a 5 out of 5 customer rating.
Its price range are fairly cheap
for its excellent Fast food.

Reference

(Gehrman et al., 2018)

image captioning

<p>A person riding a motorcycle on a dirt road.</p> 	<p>Two dogs play in the grass.</p> 	<p>A skateboarder does a trick on a ramp.</p> 	<p>A dog is jumping to catch a frisbee.</p> 
<p>A group of young people playing a game of frisbee.</p> 	<p>Two hockey players are fighting over the puck.</p> 	<p>A little girl in a pink hat is blowing bubbles.</p> 	<p>A refrigerator filled with lots of food and drinks.</p> 
<p>A herd of elephants walking across a dry grass field.</p> 	<p>A close up of a cat laying on a couch.</p> 	<p>A red motorcycle parked on the side of the road.</p> 	<p>A yellow school bus parked in a parking lot.</p> 
<p>Describes without errors</p>	<p>Describes with minor errors</p>	<p>Somewhat related to the image</p>	<p>Unrelated to the image</p>

Figure 5. A selection of evaluation results, grouped by human rating.

example by [Vinyals et al. \(2015\)](#)

neural generation models: quick intro

decoder

encoder

neural generation models: quick intro

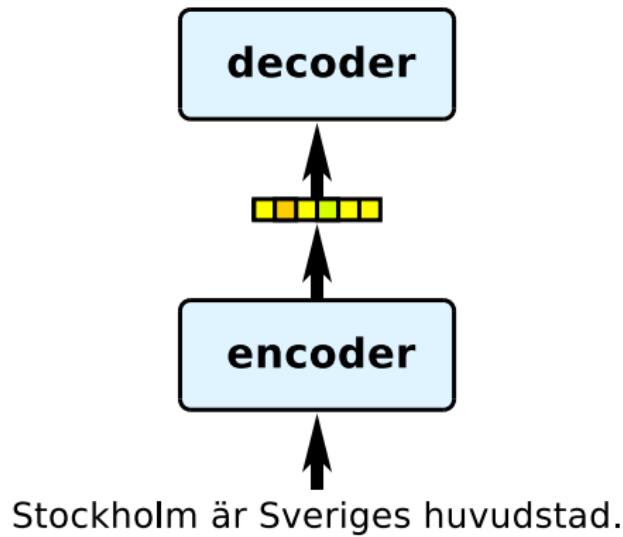
decoder

encoder

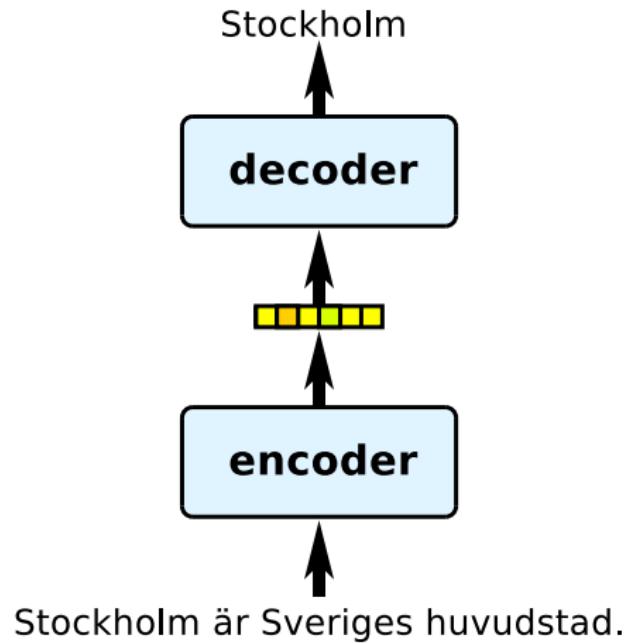


Stockholm är Sveriges huvudstad.

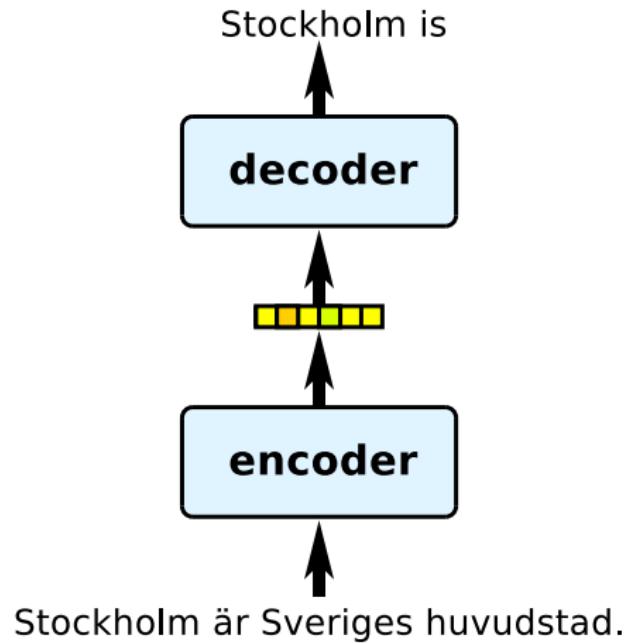
neural generation models: quick intro



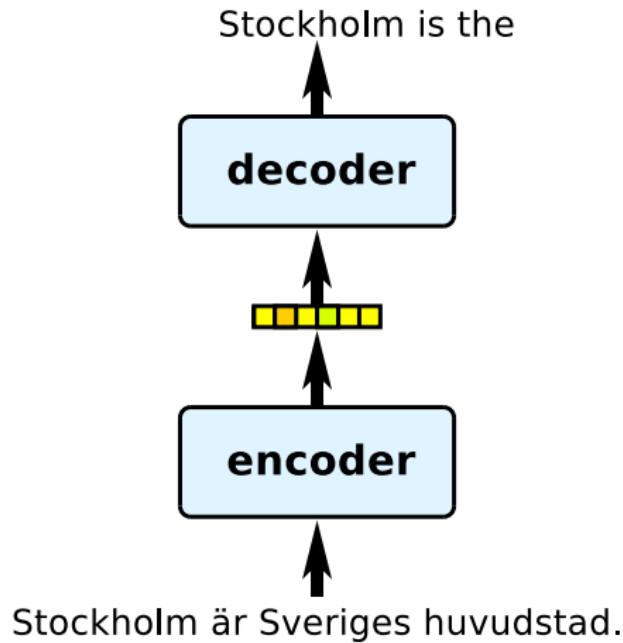
neural generation models: quick intro



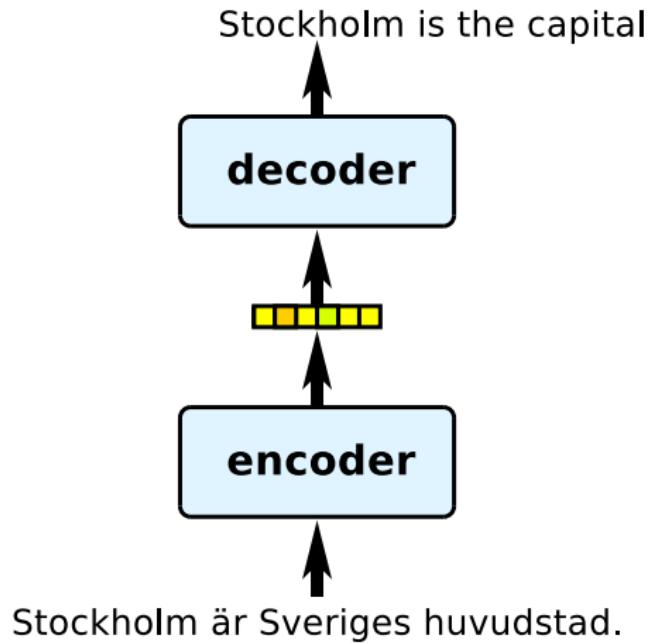
neural generation models: quick intro



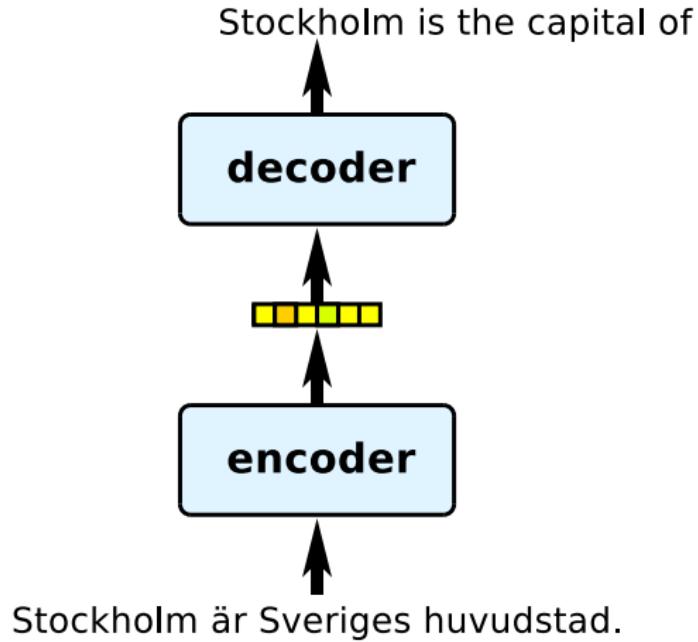
neural generation models: quick intro



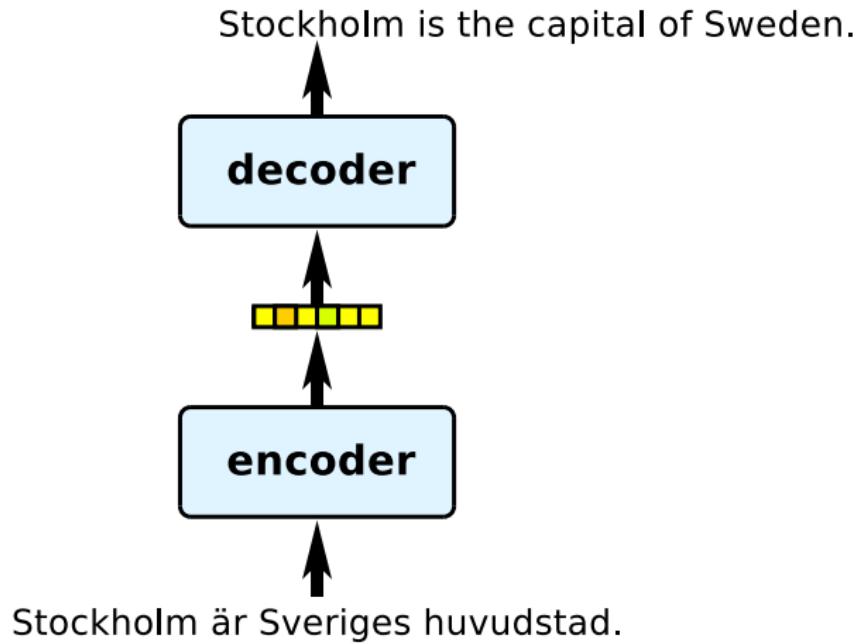
neural generation models: quick intro



neural generation models: quick intro



neural generation models: quick intro



this lecture block

- ▶ evaluation of generation systems
- ▶ introduction to machine translation
- ▶ neural models for machine translation

references

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