GANS

GENERATIVE ADVERSARIAL NETWORKS

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13 November 2017

`WiFi : SG-Guest`

Problems with Installation? **ASK!**

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PLAN OF ACTION

TODAY

- SGInnovate : Careers
- GANs ++
- Personal Project work

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PLAN OF ACTION

WEDNESDAY

- Mobile
- Personal Project work

PLAN OF ACTION

27-NOV

- Finalize Projects

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PERSONAL PROJECTS

- Form to fill in
- Plan to finish : **27**-Nov (last session)
- WSG DEADLINE : 30-Nov, including write-ups :
  - "Punchy Headline"
  - Minimum : `README.md` on GitHub page
  - Hosted slides / demo
  - Lightning Talk

GPU REQUIREMENTS

- Show of hands :
  - I have GPU(s), need more
  - I have got enough GPU lined up
  - I have no GPU and training v. painful
  - I have no GPU and it should be fine

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NEW YORK TIMES

The New York Times | TECHNOLOGY | Share 149

Tech Giants Are Paying Huge Salaries for Scarce A.I. Talent

Nearly all big tech companies have an artificial intelligence project, and they are willing to pay experts millions of dollars to help get it done.

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By CADE METZ OCT. 22, 2017

Article Link

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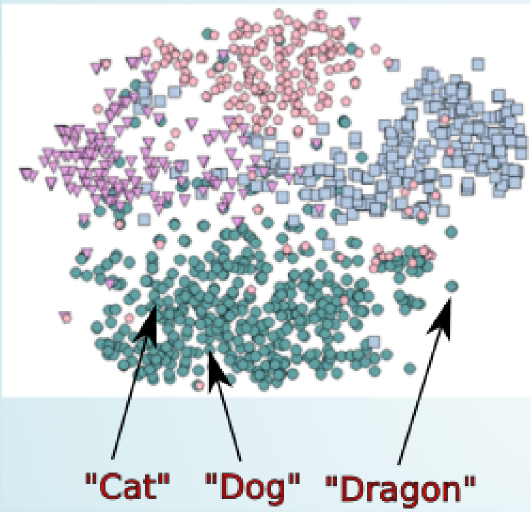
LEARNING TO TRANSLATE

WORD DICTIONARY

- Word Embedding picture
- Two Word Embeddings
- 5000 sample translations

WORD EMBEDDING

EG: 300D GLOVE



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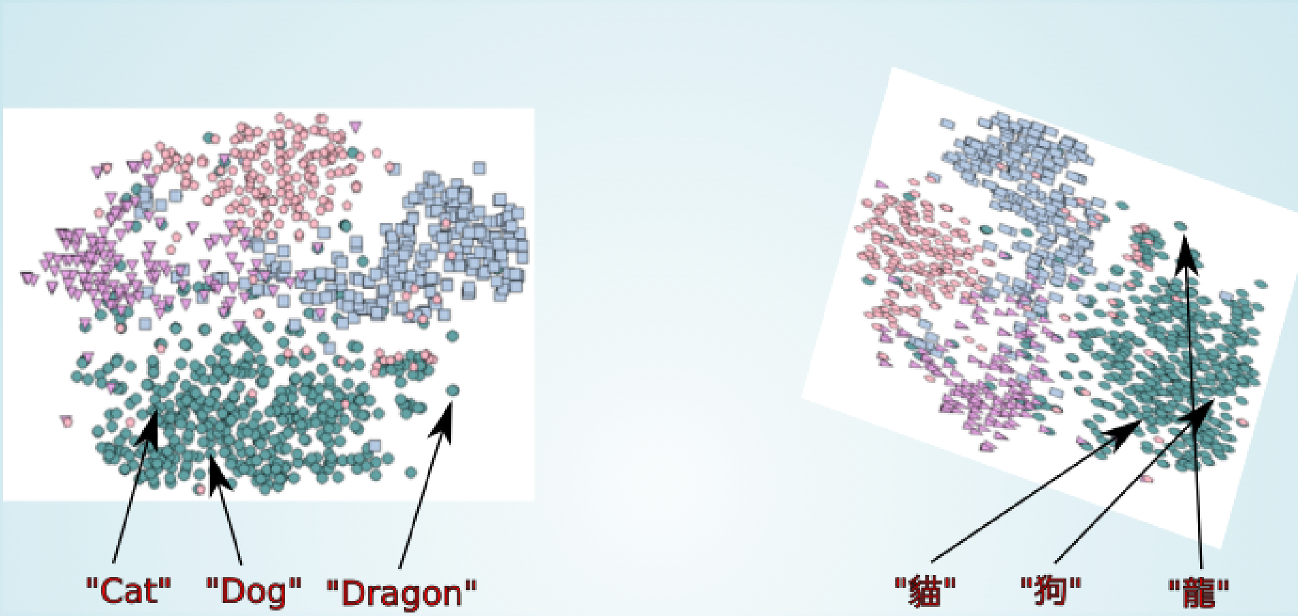
WORD EMBEDDINGS



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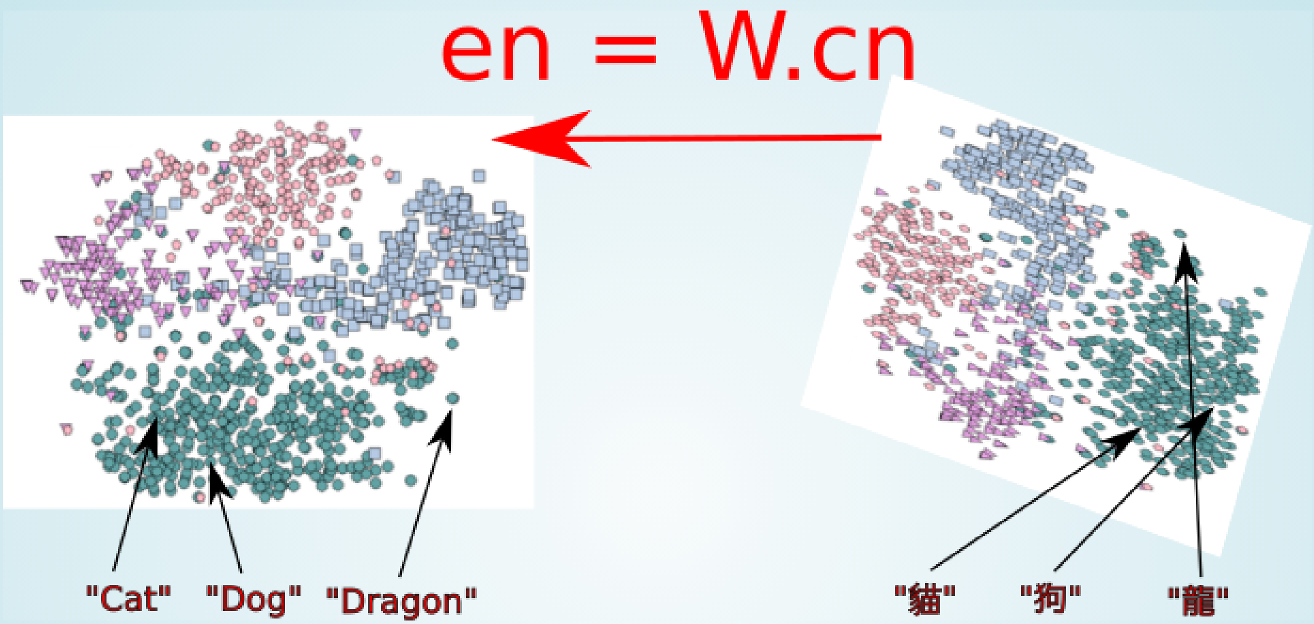
EMBEDDING TRANSFORM?



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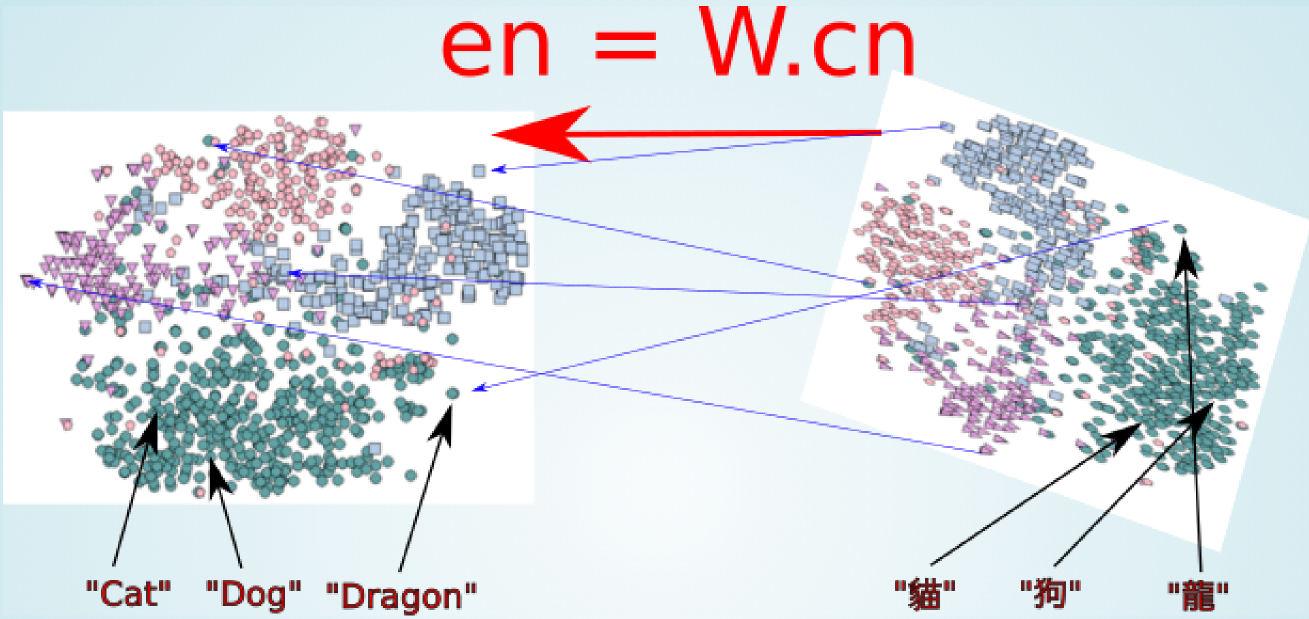
EMBEDDING MATCHES



Exploiting Similarities among Languages for Machine Translation

Need ~ 5000 translation pairs to make it work

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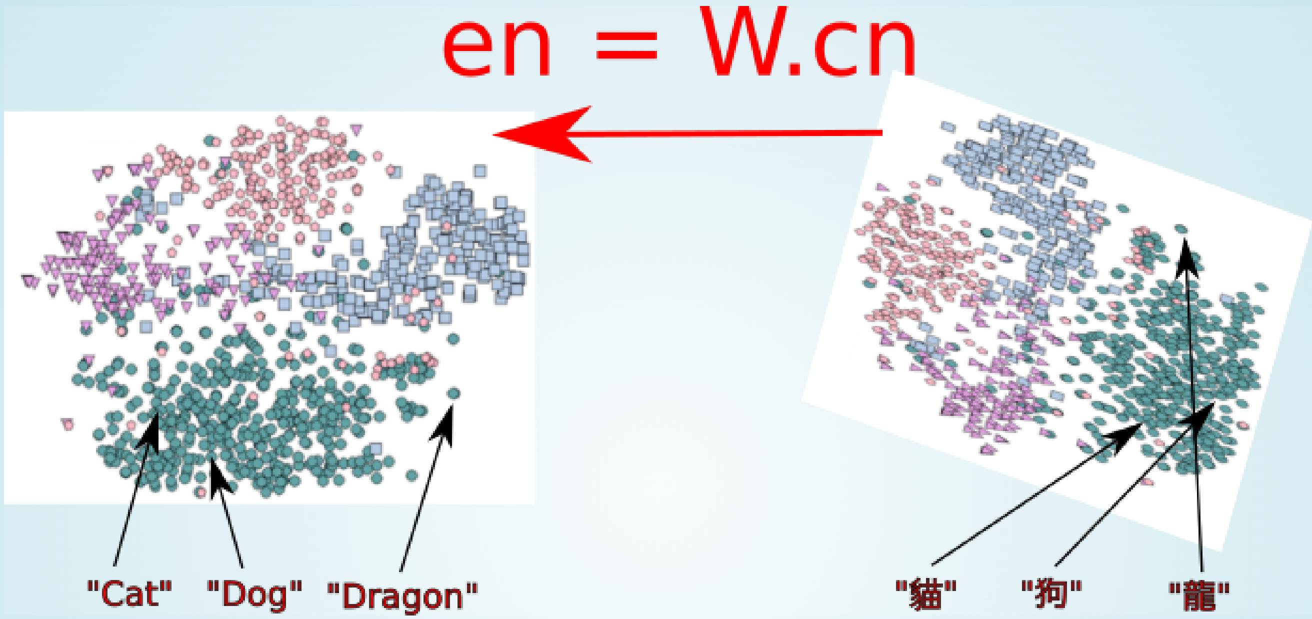
LEARNING TO TRANSLATE

WORD DICTIONARY FROM ZERO

- 0 sample translations :
  - Initial random mapping
  - Change mapping until 'similar enough'
  - Find 5000 corresponding words
  - Potentially redo a few times
- Now have 5000 word sample 'translations'

GUESS THE TRANSFORM



Word Translation Without Parallel Data (Oct 2017)

SPOT THE DIFFERENCE

TRICK : DISTRIBUTION

- Train **a network** to tell apart :
  - random english words; from
  - random chinese words transformed by `W`
- Train both the network and the `W` parameters :
  - Optimise network to categorise well
  - Optimise elements of `W` to fool the detector

SPOT THE DIFFERENCE

TRICK : CONNECTIVITY

- Find examples of `en` and `W.cn` words :
  - That have the same 'local' similarity
  - How close are they to nearest neighbours ... in other language?
  - Good 'local similarity' ~ similar 'role'
- Pick 5000 of the 'good' matches
- Use them in the previous method

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DICTIONARY FROM ZERO

RESULTS

	English to Italian			Italian to English		
	P@1	P@5	P@10	P@1	P@5	P@10
Methods with cross-lingual supervision						
Mikolov et al. (2013b) †	33.8	48.3	53.9	24.9	41.0	47.4
Dinu et al. (2015)†	38.5	56.4	63.9	24.6	45.4	54.1
CCA†	36.1	52.7	58.1	31.0	49.9	57.0
Artetxe et al. (2017)	39.7	54.7	60.5	33.8	52.4	59.1
Smith et al. (2017)†	43.1	60.7	66.4	38.0	58.5	63.6
Procrustes - CSLS	44.9	61.8	66.6	38.5	57.2	63.0
Methods with cross-lingual supervision (Wiki)						
Procrustes - CSLS	63.7	78.6	81.1	56.3	76.2	80.6
Methods without cross-lingual supervision (Wiki)						
Adv - Refine - CSLS	**66.2**	**80.4**	**83.4**	**58.7**	**76.5**	**80.9**

Word Translation Without Parallel Data (Oct 2017)

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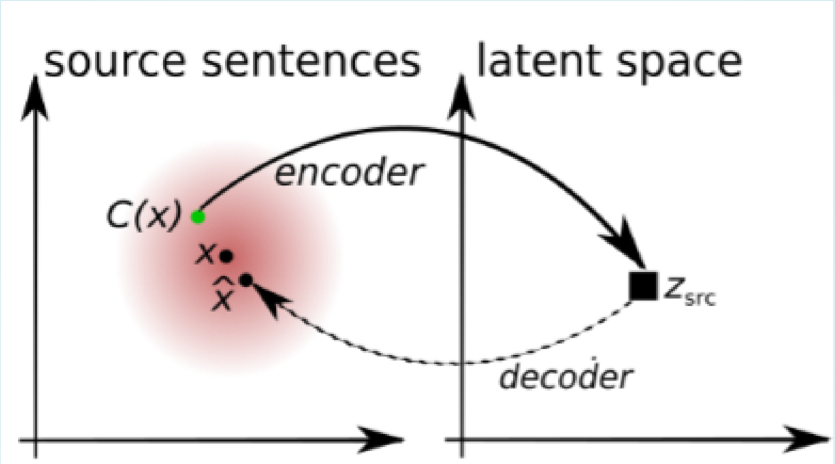
LEARNING TO TRANSLATE

SENTENCES FROM ZERO

- Unsupervised Machine Translation Using Monolingual Corpora Only (Nov 2017)
- Basic approach :
  - Learn to fix sentences in each language
  - First translation : word-by-word using dictionary
  - Iteratively fix-up the result
- No translations required

FIX UP SENTENCES



Corrupt sentences by dropping or switching words

Do this in both languages with same 'latent' space

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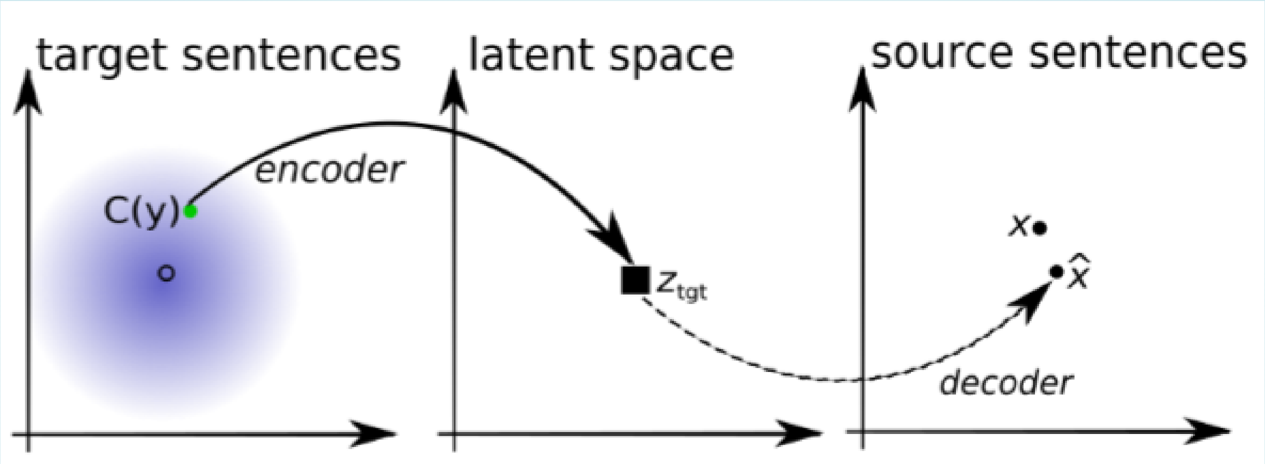
LANGAUGE MODELS

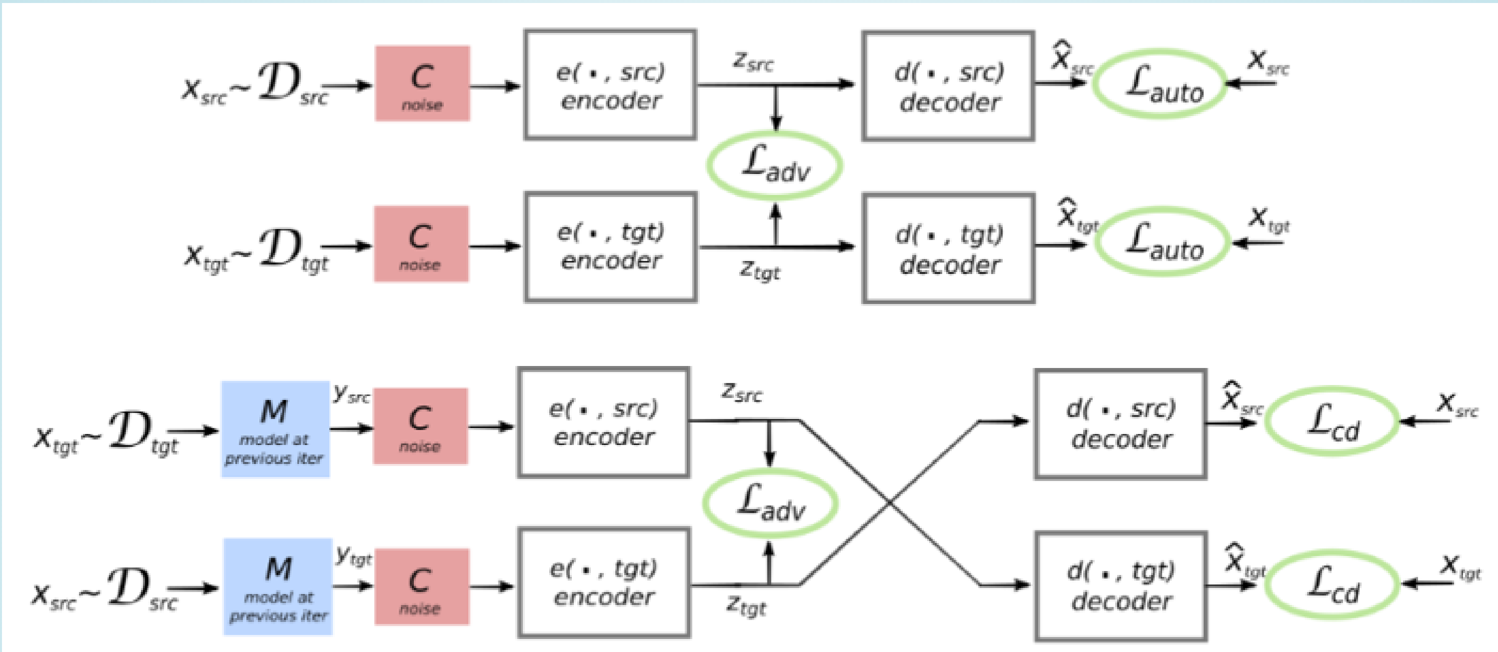
- Translation model :
  - Encoder : LSTM (to latent space vectors)
  - Decoder : LSTM with attention over latent
- Same model used in both directions
  with different embedding dictionaries

FIX UP TRANSLATION



Take a bad translation and fix it up

MATCH DISTRIBUTIONS



Three different Losses to fix at same time

This changes Encoder & Decoder

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RESULTS

	Multi30k-Task1				WMT			
	en-fr	fr-en	de-en	en-de	en-fr	fr-en	de-en	en-de
Supervised	56.83	50.77	38.38	35.16	27.97	26.13	25.61	21.33
word-by-word	8.54	16.77	15.72	5.39	6.28	10.09	10.77	7.06
word reordering	-	-	-	-	6.68	11.69	10.84	6.70
oracle word reordering	11.62	24.88	18.27	6.79	10.12	20.64	19.42	11.57
Our model: 1st iteration	27.48	28.07	23.69	19.32	12.10	11.79	11.10	8.86
Our model: 2nd iteration	31.72	30.49	24.73	21.16	14.42	13.49	13.25	9.75
Our model: 3rd iteration	32.76	32.07	26.26	22.74	15.05	14.31	13.33	9.64

Table 1: **BLEU score on the WMT and Multi30k-Task1 datasets** using greedy decoding.

Similar to system with 100k sample translations…

SAMPLES

Source	un homme est debout près d' une série de jeux vidéo dans un bar .
Iteration 0	a man is seated near a series of games video in a bar .
Iteration 1	a man is standing near a closeup of other games in a bar .
Iteration 2	a man is standing near a bunch of video video game in a bar .
Iteration 3	a man is standing near a bunch of video games in a bar .
Reference	**a man is standing by a group of video games in a bar .**
Source	une femme aux cheveux roses habillée en noir parle à un homme .
Iteration 0	a woman at hair roses dressed in black speaks to a man .
Iteration 1	a woman at glasses dressed in black talking to a man .
Iteration 2	a woman at pink hair dressed in black speaks to a man .
Iteration 3	a woman with pink hair dressed in black is talking to a man .
Reference	**a woman with pink hair dressed in black talks to a man .**
Source	une photo d' une rue bondée en ville .
Iteration 0	a photo a street crowded in city .
Iteration 1	a picture of a street crowded in a city .
Iteration 2	a picture of a crowded city street .
Iteration 3	a picture of a crowded street in a city .
Reference	**a view of a crowded city street .**

Table 2: **Unsupervised translations.** Examples of translations on the French-English pair of the Multi30k-Task1 dataset. Iteration 0 corresponds to word-by-word translation. After 3 iterations, the model generates very good translations.

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- QUESTIONS -

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