If you seek to enroll in PhD to do research in AI, ML, Deep Learning

Deadline is **June 20, 2024 – Oral exam is July 22, 2024**

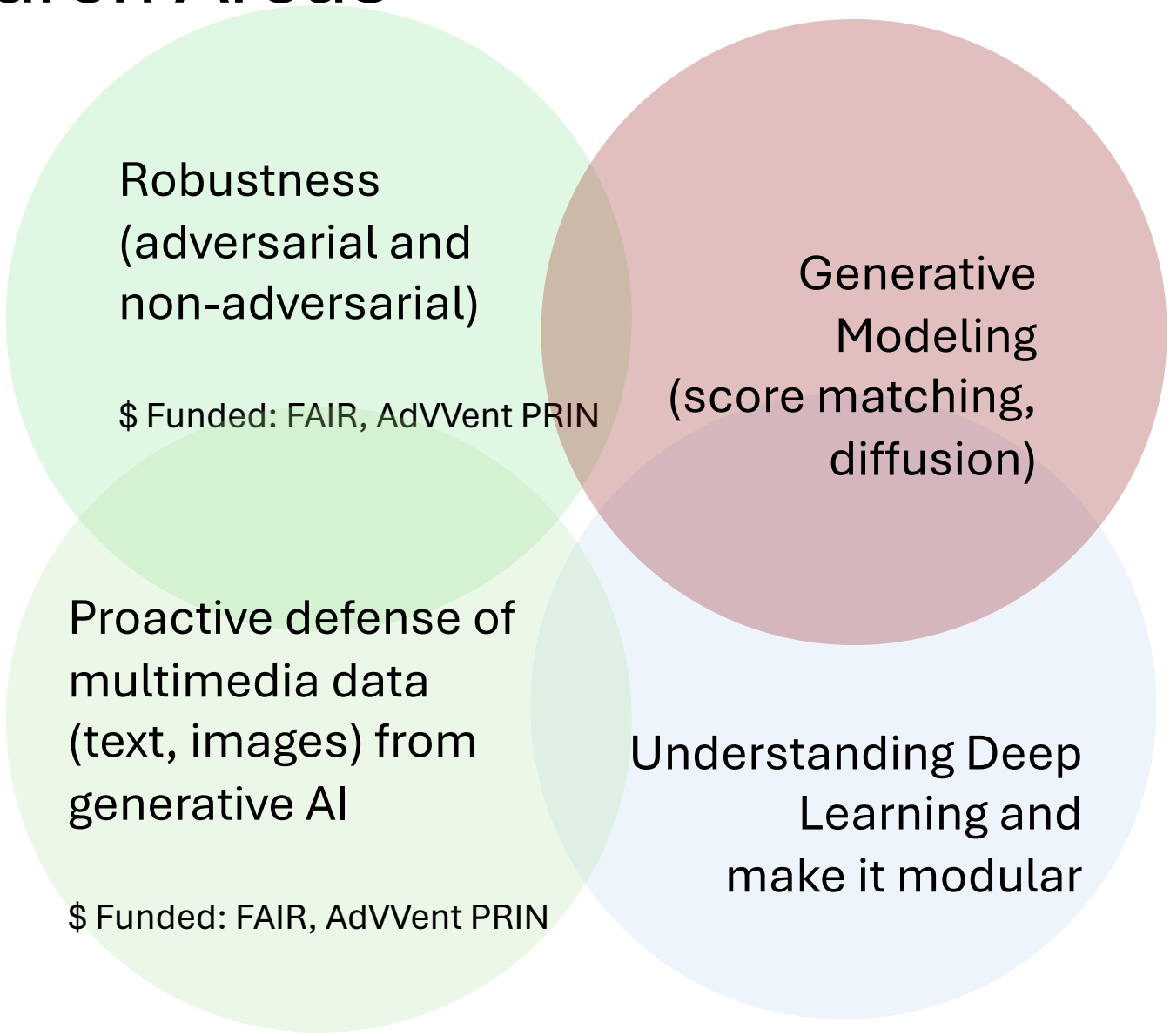
1. Find an advisor
2. Research theme shared by both you and advisor (need to sync)
3. CV, Research proposals, 2 letters of recommendation, motivation letter, abstract tesi

I am "involved" with 4 PhD courses:

1. "Our" PhD in Computer science – Coord. Prof. M. Macini
2. PhD in Cybersecurity – Coord. Prof Querzoni
3. National PhD in AI – Coord. Prof. Lenzerini
4. Data Science – Coord. Prof. Silvestri

More info on CS PhD https://phd.uniroma1.it/web/concorso40.aspx?i=3507&l=IT
Call for PhD is at https://www.uniroma1.it/sites/default/files/user/1824/bando_con_allegati_per_pubblic_web_2.pdf

Research Areas



Research Lab

OmnAI Lab News People Publications Projects Contact

OmnAI Lab

OmnAI lab (pronounced /ɒmn/ɑɪ/) is a research lab 🔬based in Sapienza, University of Rome. **Omnia is Latin for "everything" and AI stands for "artificial intelligence"**🤖; the Om 🕉️ is also the original vibration of the universe. We study computational models of learning and inference and, more generally, study how to make machines intelligent 🧠 to a certain degree (Artificial Intelligence). We believe that, despite recent progress, the way towards Artificial General Intelligence (AGI) is far away and we need inputs from multidisciplinary fields to make this happen. We focus our research mainly in the visual domain *(computer vision)* 📷 but we also draw inspiration from other fields such as *computer graphics, natural language processing* 📚. Our research is mainly empirically centered on **machine learning and deep learning** yet their foundations rest on mathematical tools 🧮 like linear algebra, high-dimensional geometry, and optimization. We currently have several lines of research that are all intertwined, touching on multiple aspects: **adversarial robustness, proactive defense to image manipulation, inverse problems, and generative AI**.

Research Group 👩‍🏫

Latest News

Awarded a PRIN 2022 research grant by MUR

We have been awarded a research grant PRIN 2022 by MUR (Ministry of University and Research)

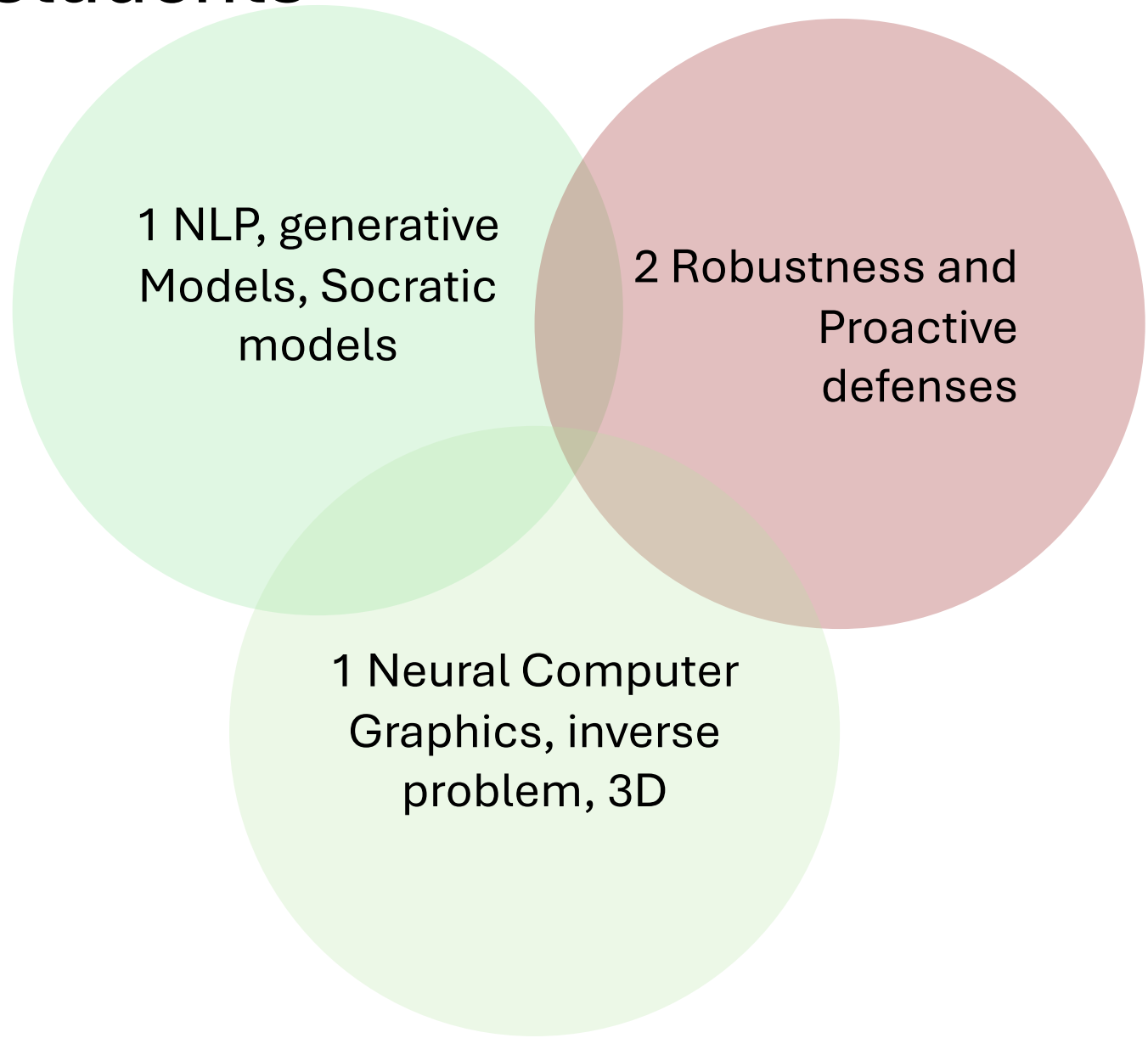
Jul 1, 2023 · 2 min read

We will be part of the FAIR PNRR project in Spoke 5

We will be part of the FAIR (Future of AI research) PNRR project in Spoke 5

Mar 1, 2023 · 3 min read

PhD students



Research Group

Principal Investigator

Iacopo Masi

Associate Professor (PI)

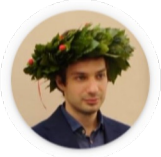
Computer Vision and Graphics, Biometrics, Artificial Intelligence

PhD Students

Maria Rosaria Briglia

PhD Student

Diffusion Models, Adversarial Machine Learning, Explainble AI



Antonio D'Orazio

PhD Student

Computer Graphics, Inverse Problems, Neuro-Symbolic AI

Robert Adrian Minut

PhD Student

Large Language Models, Generative Models, Energy-based Models

Mirza Mujtaba Hussain

PhD Student

Adversarial Machine Learning, Energy-based Models, Explainable AI

Past Members

Senad Beadini

Machine Learning Engineer and AI Researcher

Machine Learning, Computer Vision

Mozhdeh Rouhsedaghat

Lead Research Scientist at PayPal

Artificial Intelligence, Computer Vision

No lecture on May 30

Exam Prep

Multiple type of questions:

1. Definitions or “knowledge-based” to see if you know just the “raw content”
2. Small numerical exercises to check if you know what happens inside the machines:
   - BPTT with Computational Graphs, Model predictions
   - Small codes (and ask to explain what is happening)
3. Questions where we seek for connections between different topics seeing in the course *or* connections between different models we have seeing and NLP applications.
   1. *You have a trained word2vec and you seek to make it a minimal autoregressive LM. What do you do? Do you have to re-train it to do that or not? If yes expain what would you change; if no, explain how to use it as LM.*

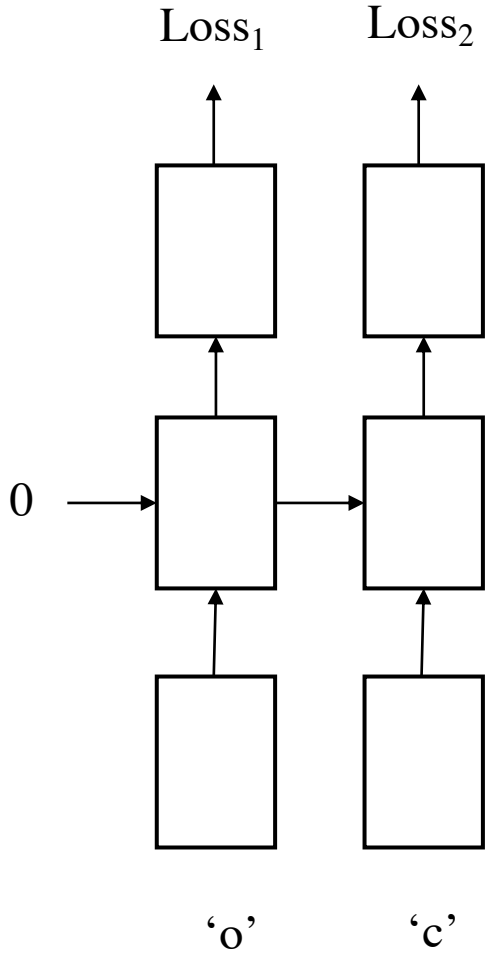
Theory exam is just 60% of final score (32 points)

HWp or HW can help you raise the score (40%) or push it even down

If you have doubts check the rules on classroom

For instance...

Loss = $Loss_1 + Loss_2$



Vocab = ['i', 'o', 'c' , 'a']

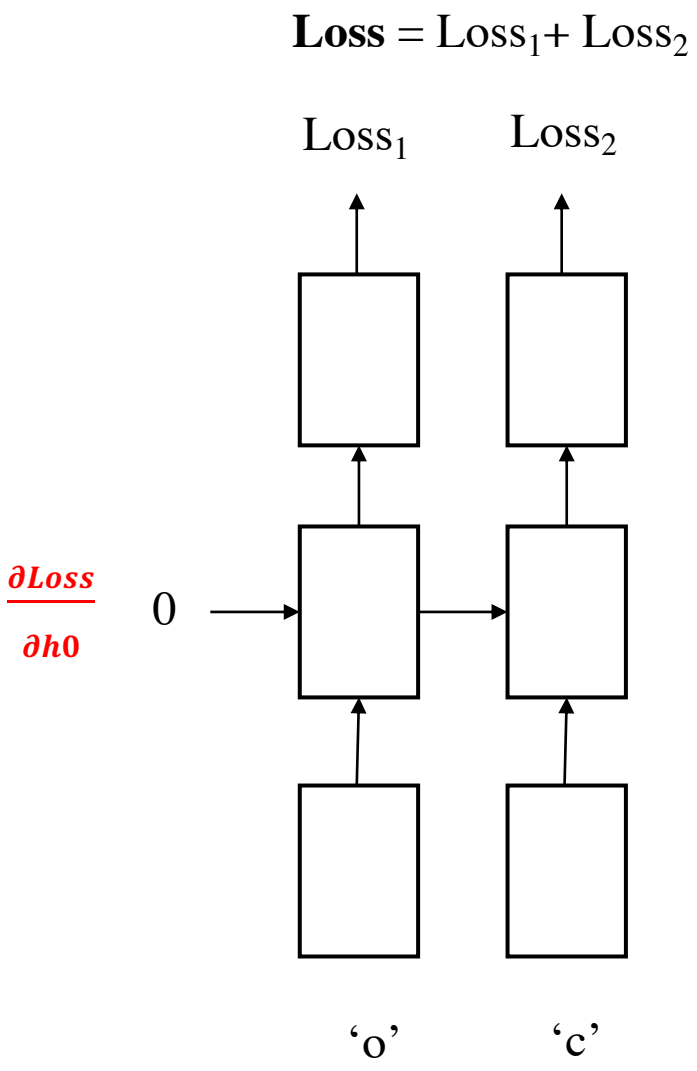
Embeddings = [-2, 5, 1, 9]

W_h= -5

Wx=1

Wy=-1

Elman RNN
Activation is f(x)=x
No bias



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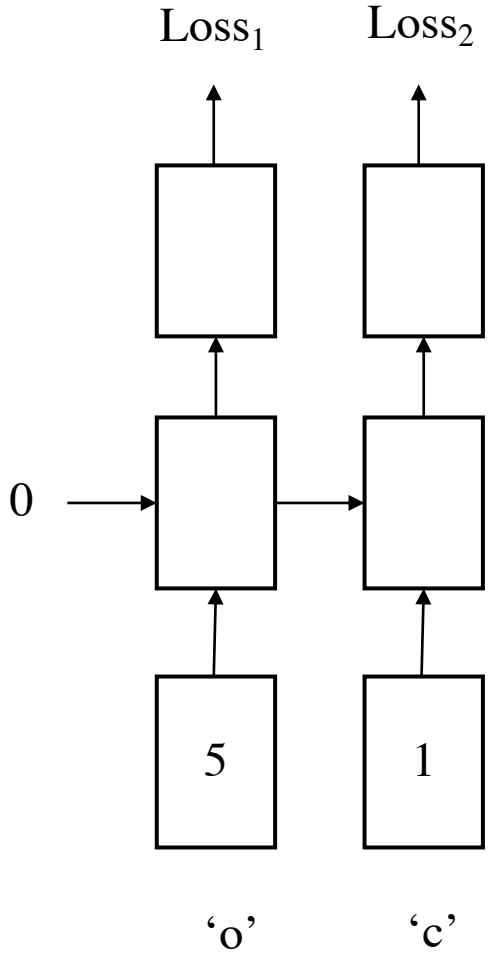
What is the gradient of the loss on h_0?

Loss = $Loss_1 + Loss_2$



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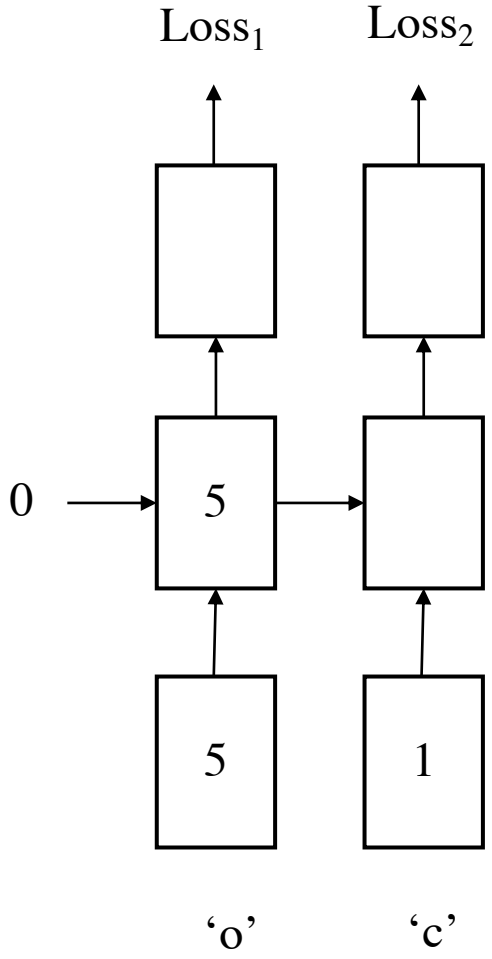

$$\sigma\left(W_h \cdot h_{t-1} + W_x \cdot x\right)$$

$$\begin{bmatrix} W_h & W_x \end{bmatrix} \begin{pmatrix} h_{t-1} \\ x \end{pmatrix}$$

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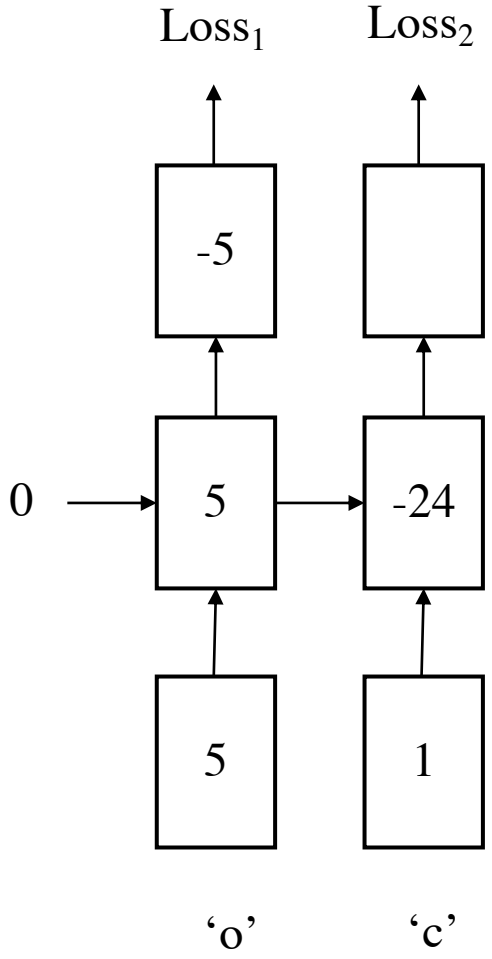

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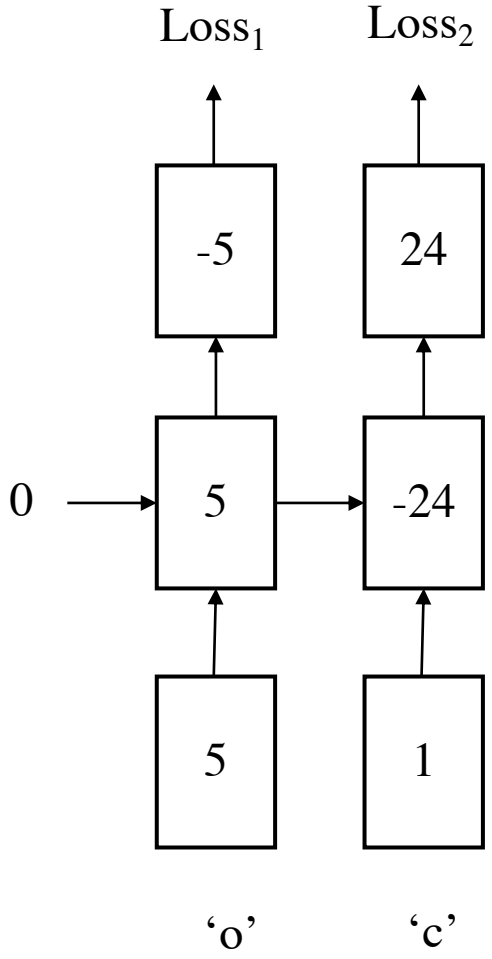

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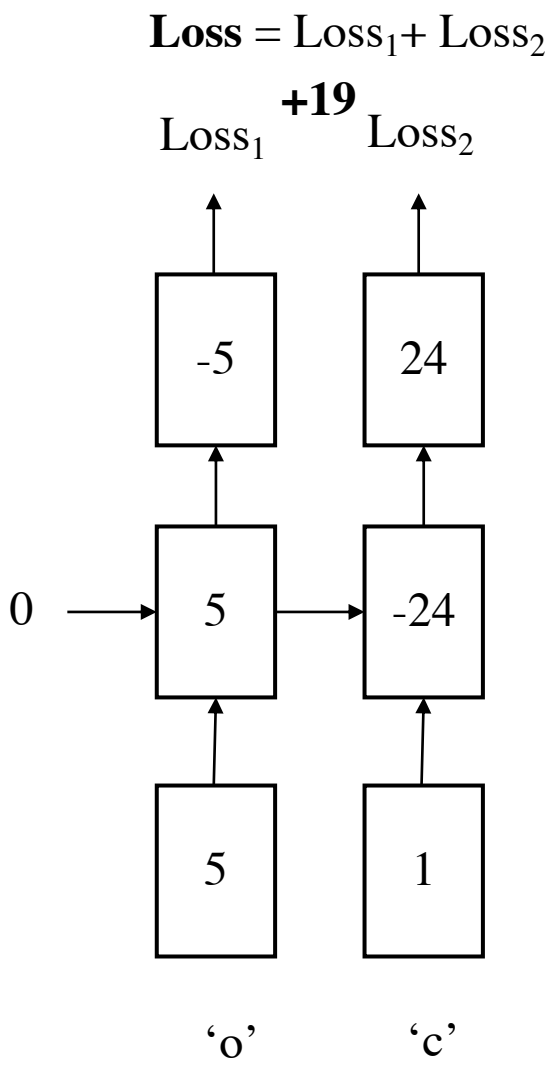

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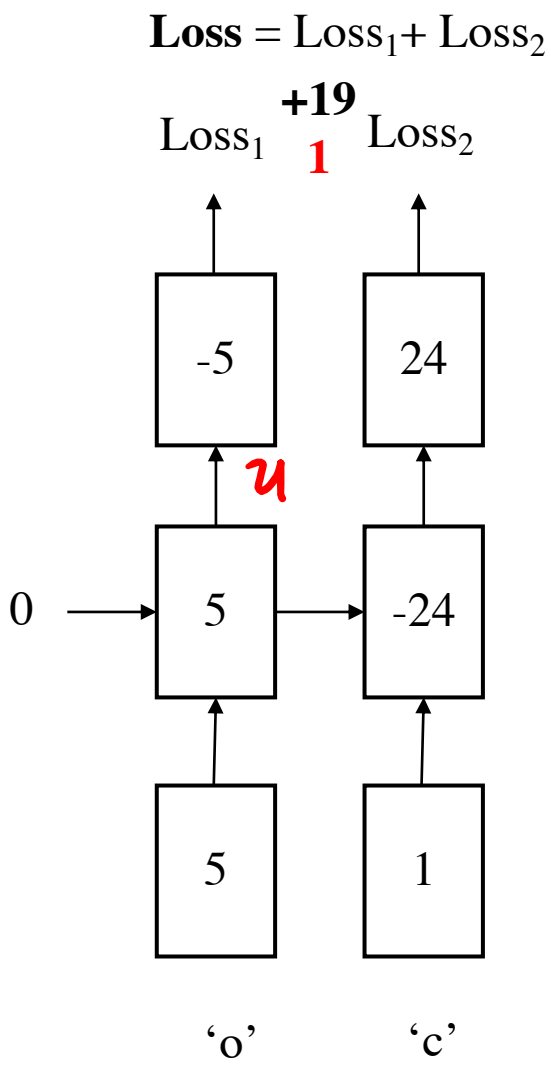

$y = W_y \cdot u$

$-1 \cdot 5$

$\frac{2y}{2y} = -1$

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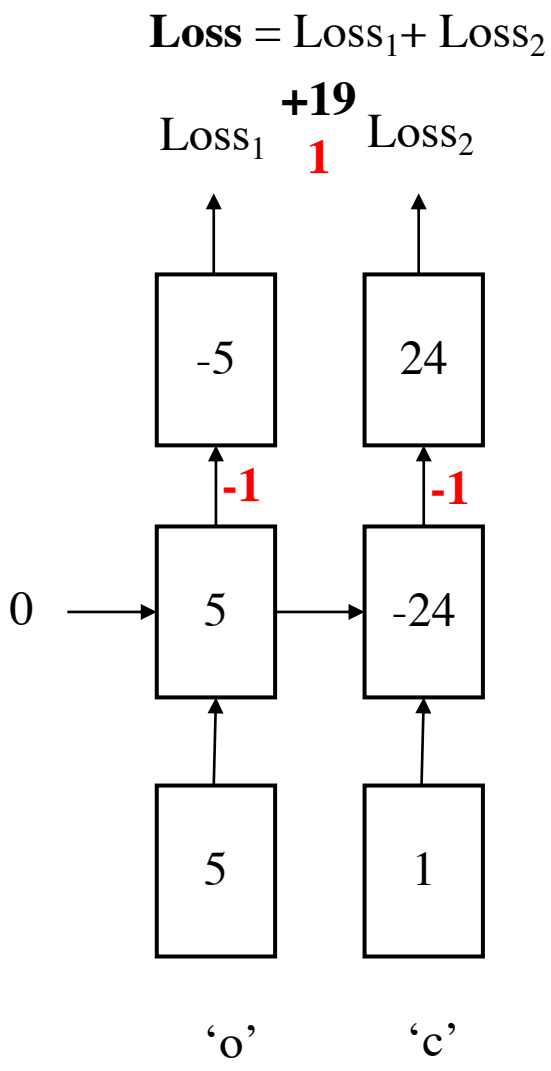

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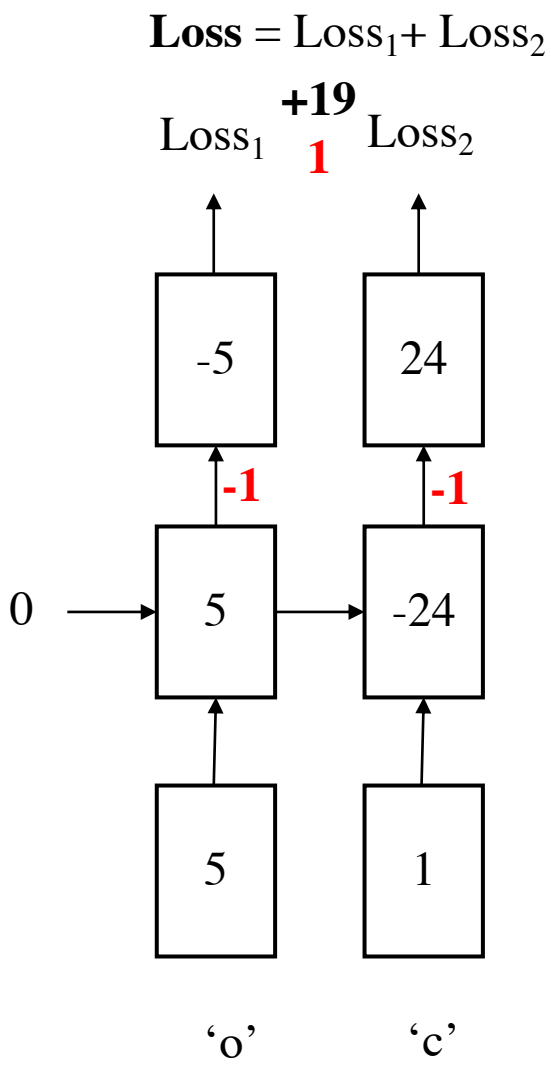

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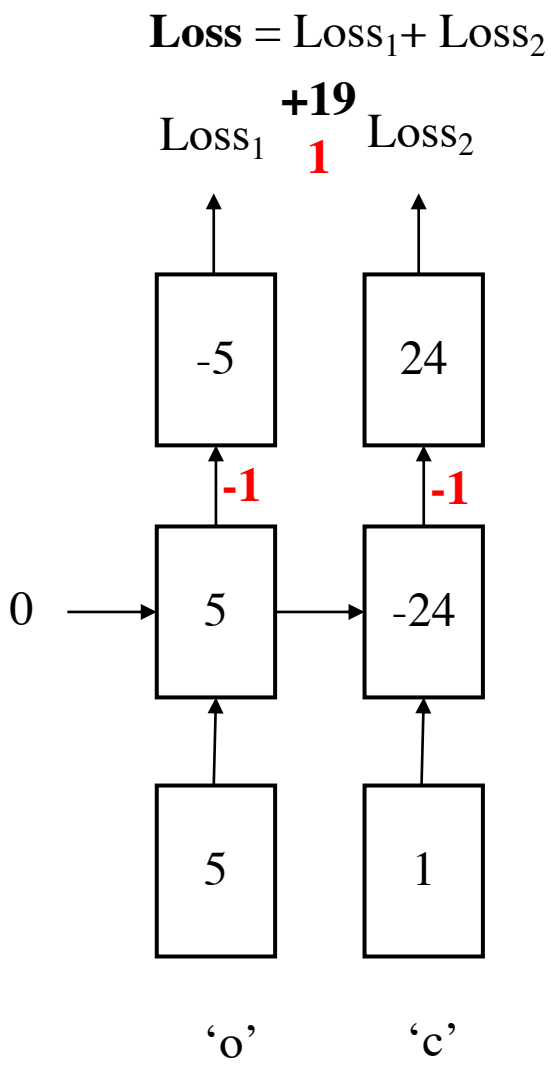
$$f(h_{t-1}, --) = W_h \cdot h_{t-1} + W_x \cdot x_t$$

$$\frac{\partial f(h_{t-1})}{\partial h_{t-1}} = W_h$$



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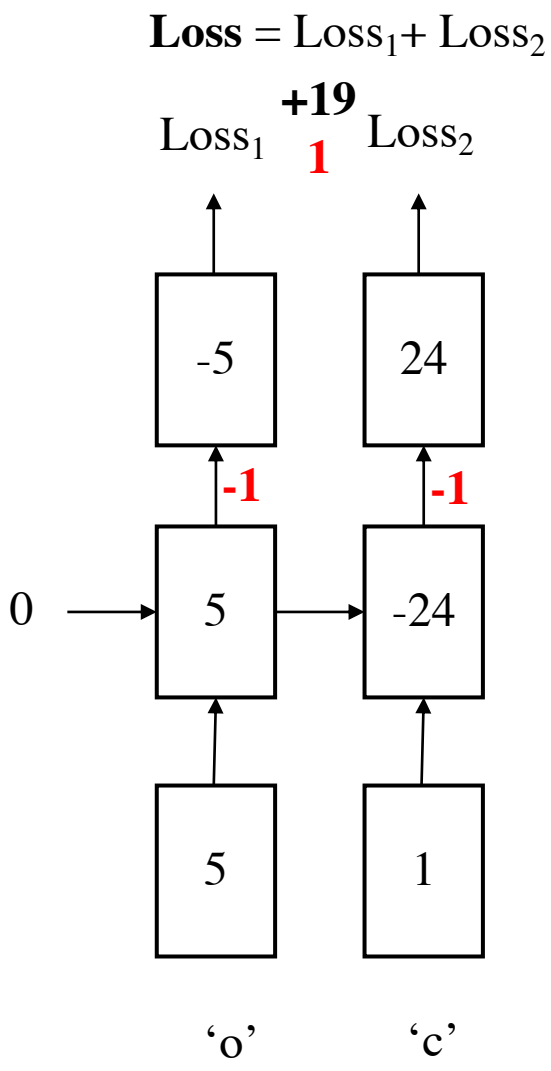

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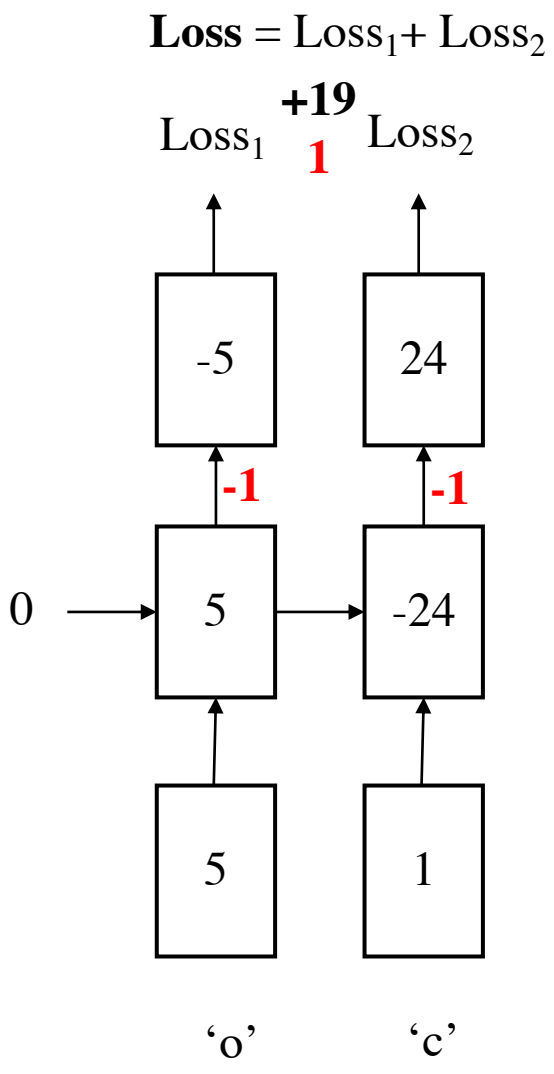

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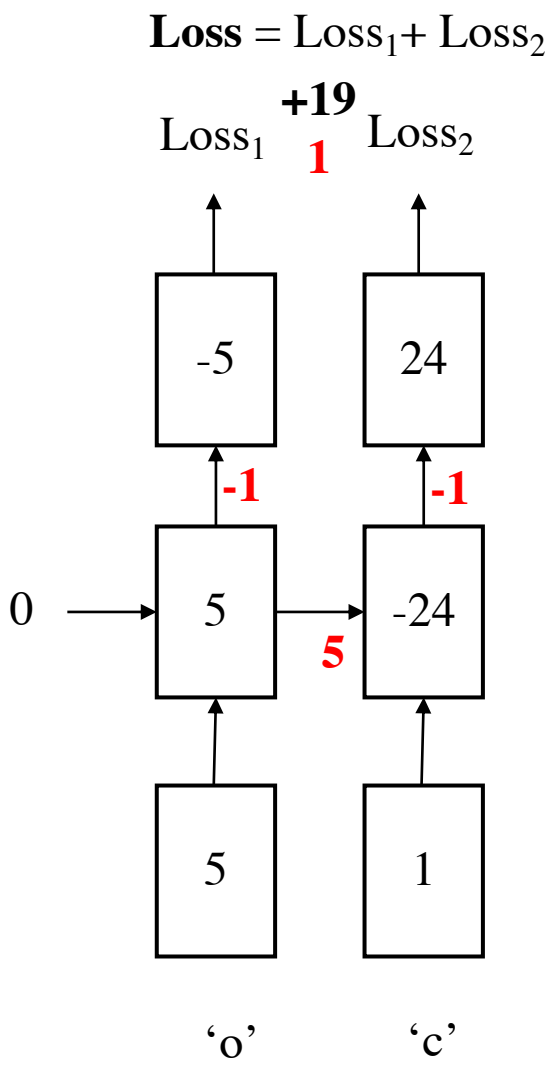
$$\frac{\partial f(h_{t-1})}{\partial h_{t-1}} = W_h \quad \underbrace{-5}_{\text{local}} \cdot \underbrace{-1}_{\text{upstream}}$$



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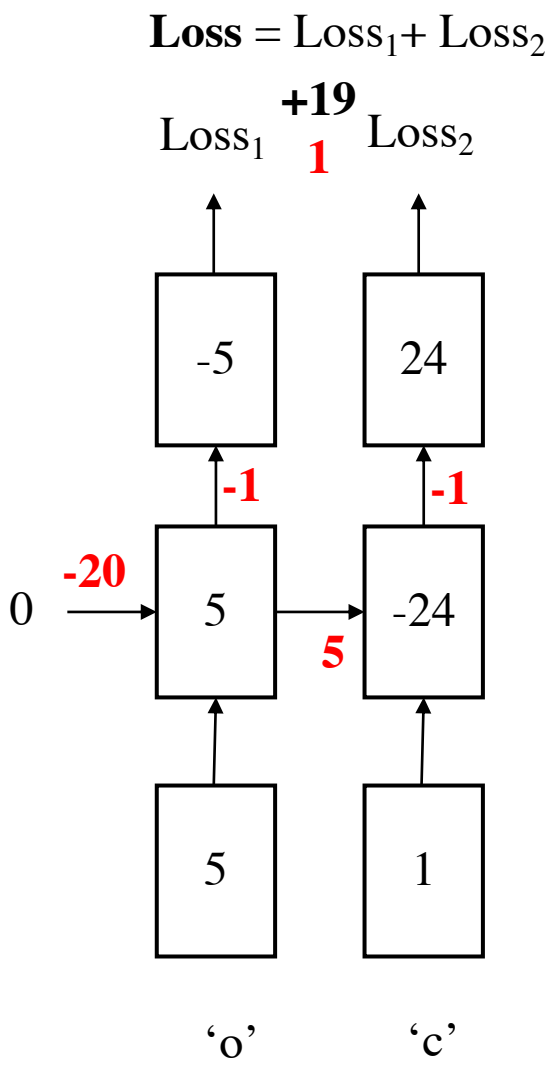

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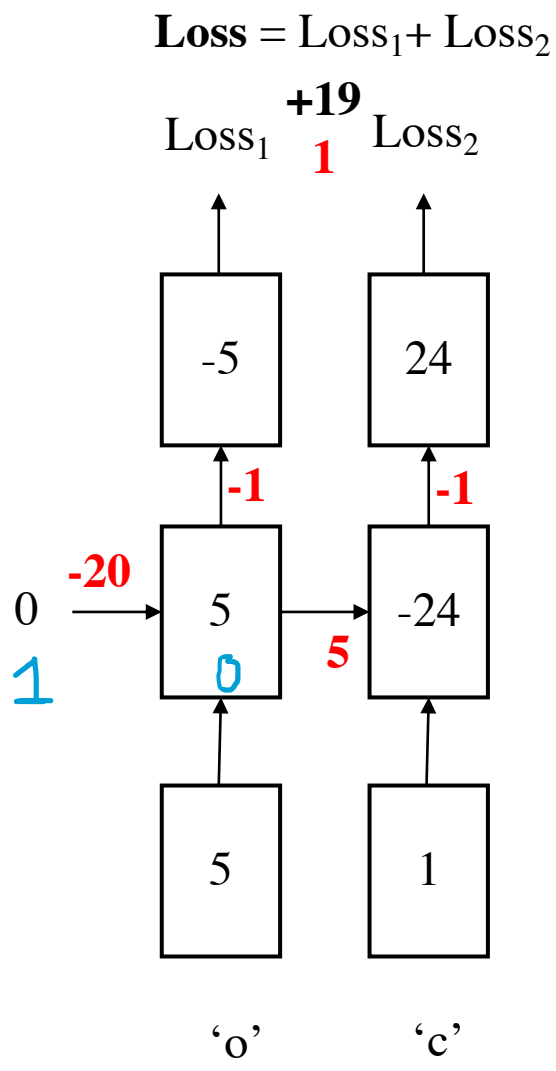

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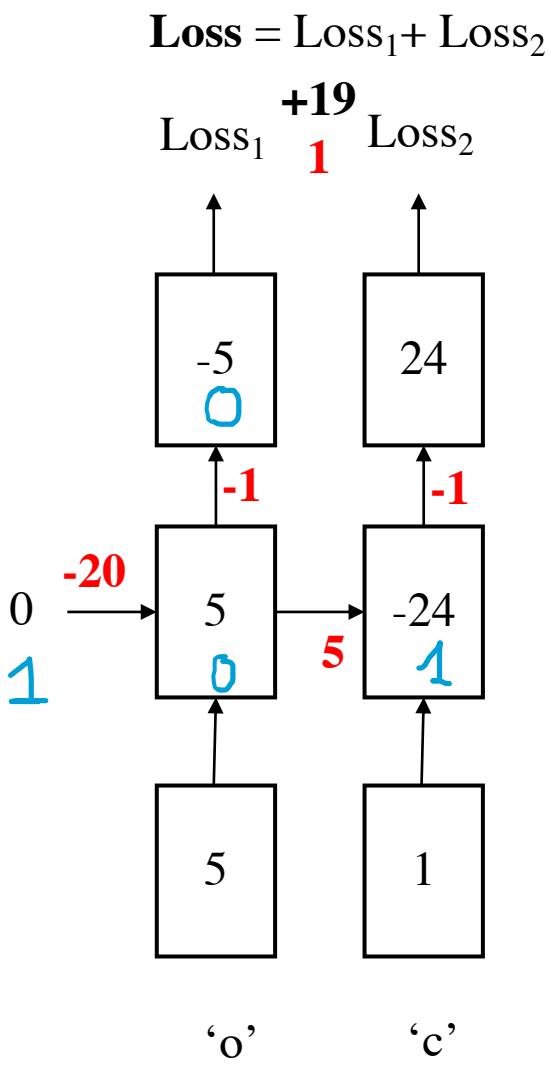

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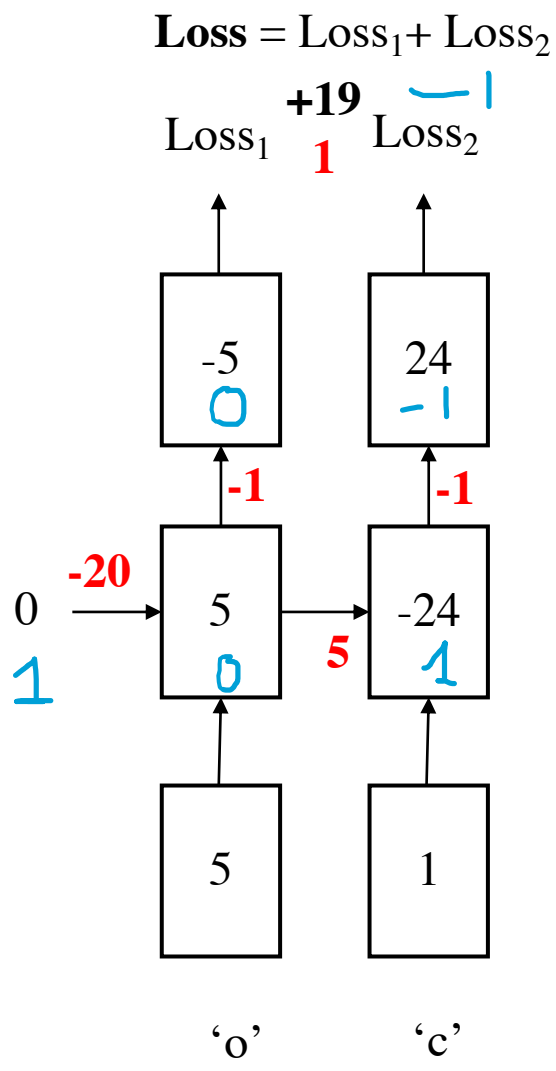

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