Machine Learning for Biblical Hebrew

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ULB UNIVERSITÉ LIBRE DE BRUXELLES

Lorentz Workshop Leiden 2020

KU LEUVEN

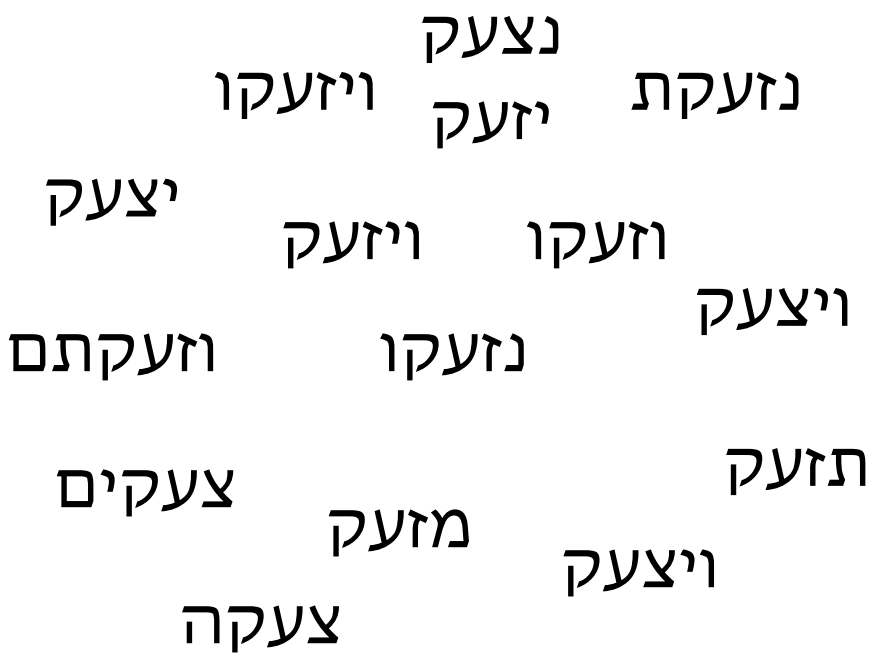
Goals

What level of contextual analysis is useful?

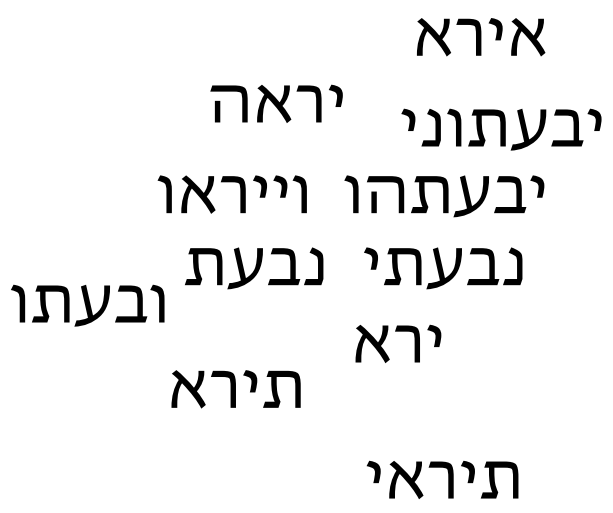
Which features are important?

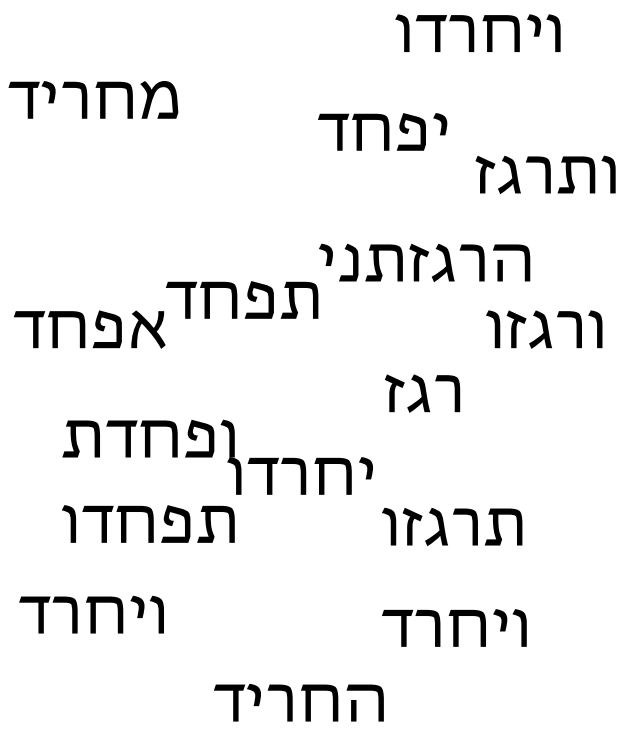
Data Modelling/pre-processing?

Motivating Example: Lexical Choice



Motivating Example: Lexical Choice





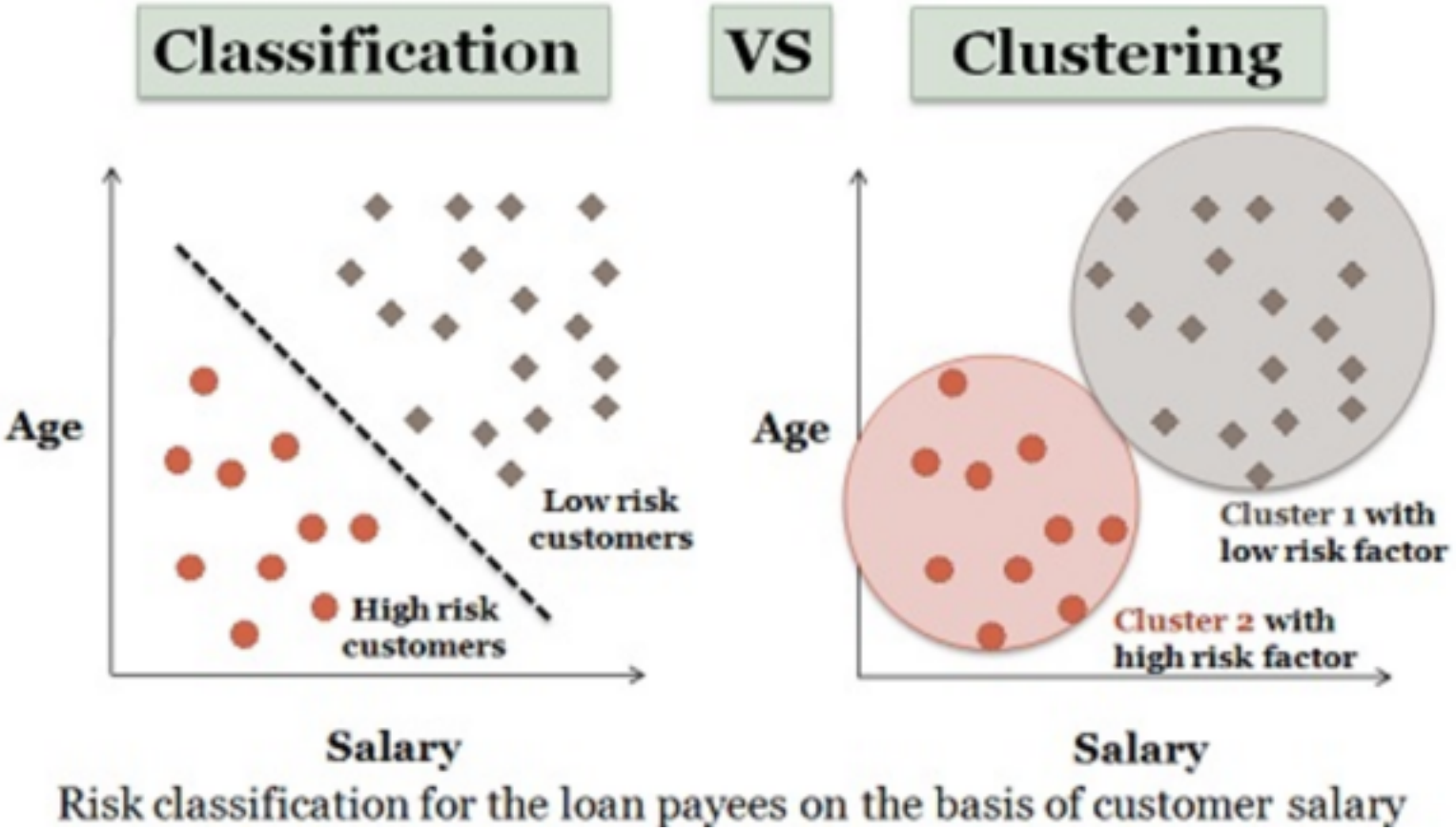
Motivating example: Lexical Choice

קום as ‘going to’ or ‘beginning’.

E.g.: Gen 27:19 : קוּם-נָא שְׁבָה, וְאָכְלָה מִצֵּידִי

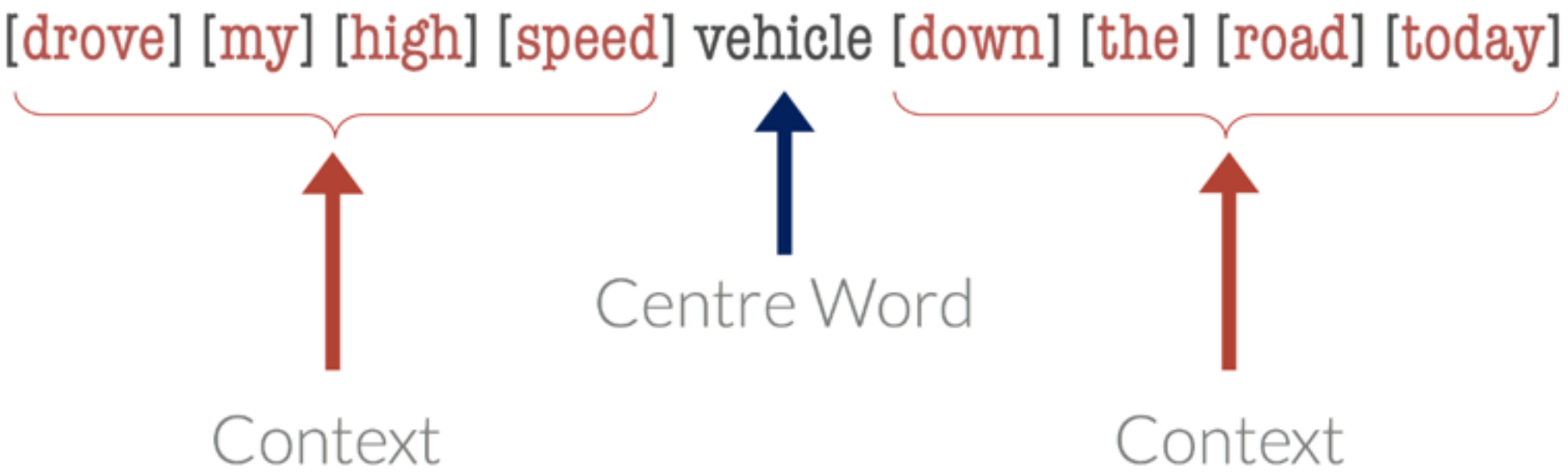
Stand up and sit down, and eat of my venison

Machine Learning

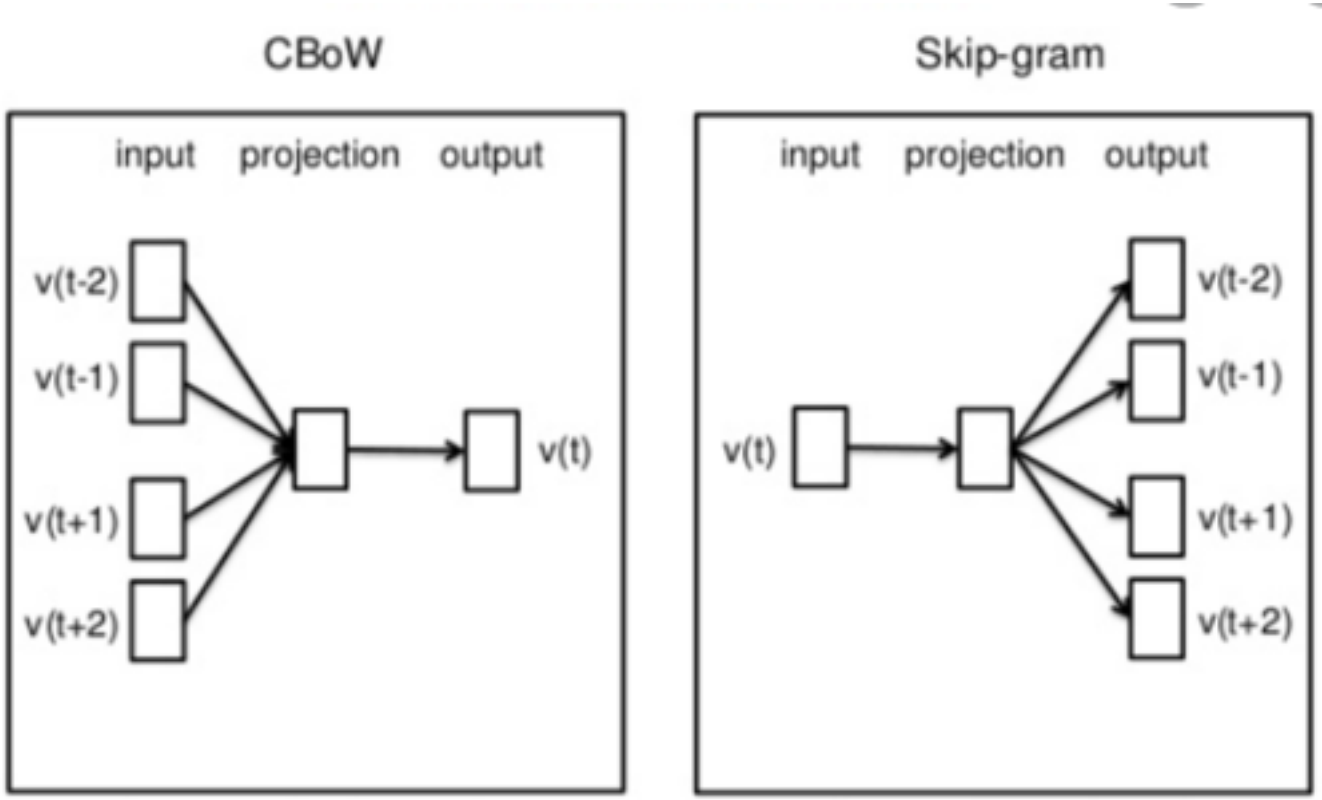


Risk classification for the loan payees on the basis of customer salary

Word Embeddings



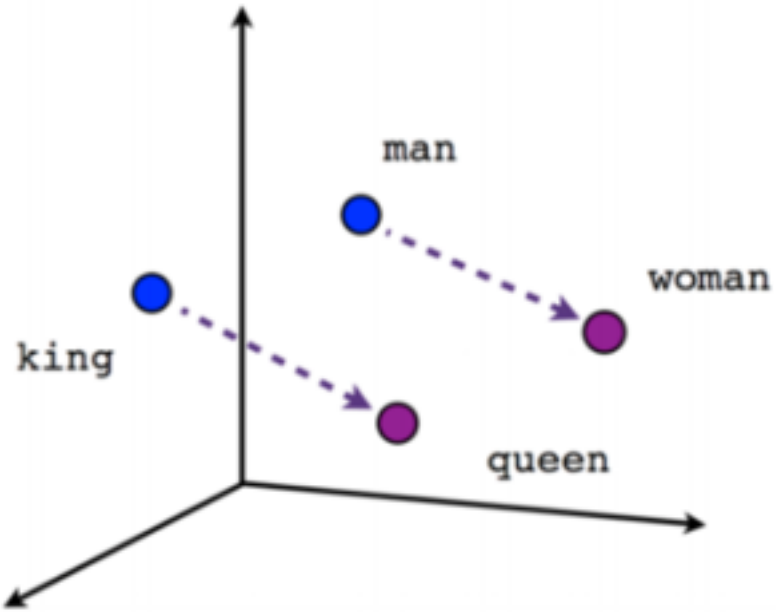
Word Embeddings

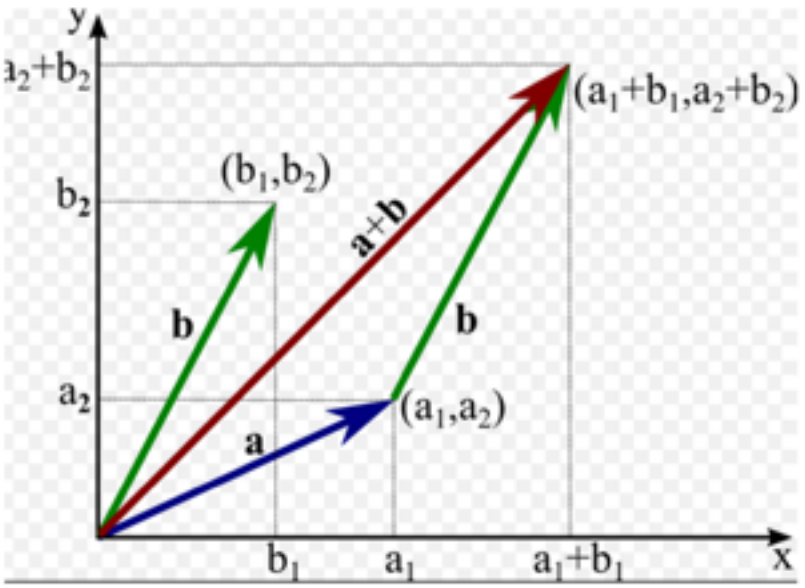


- given context words
- predict a probability of a target word

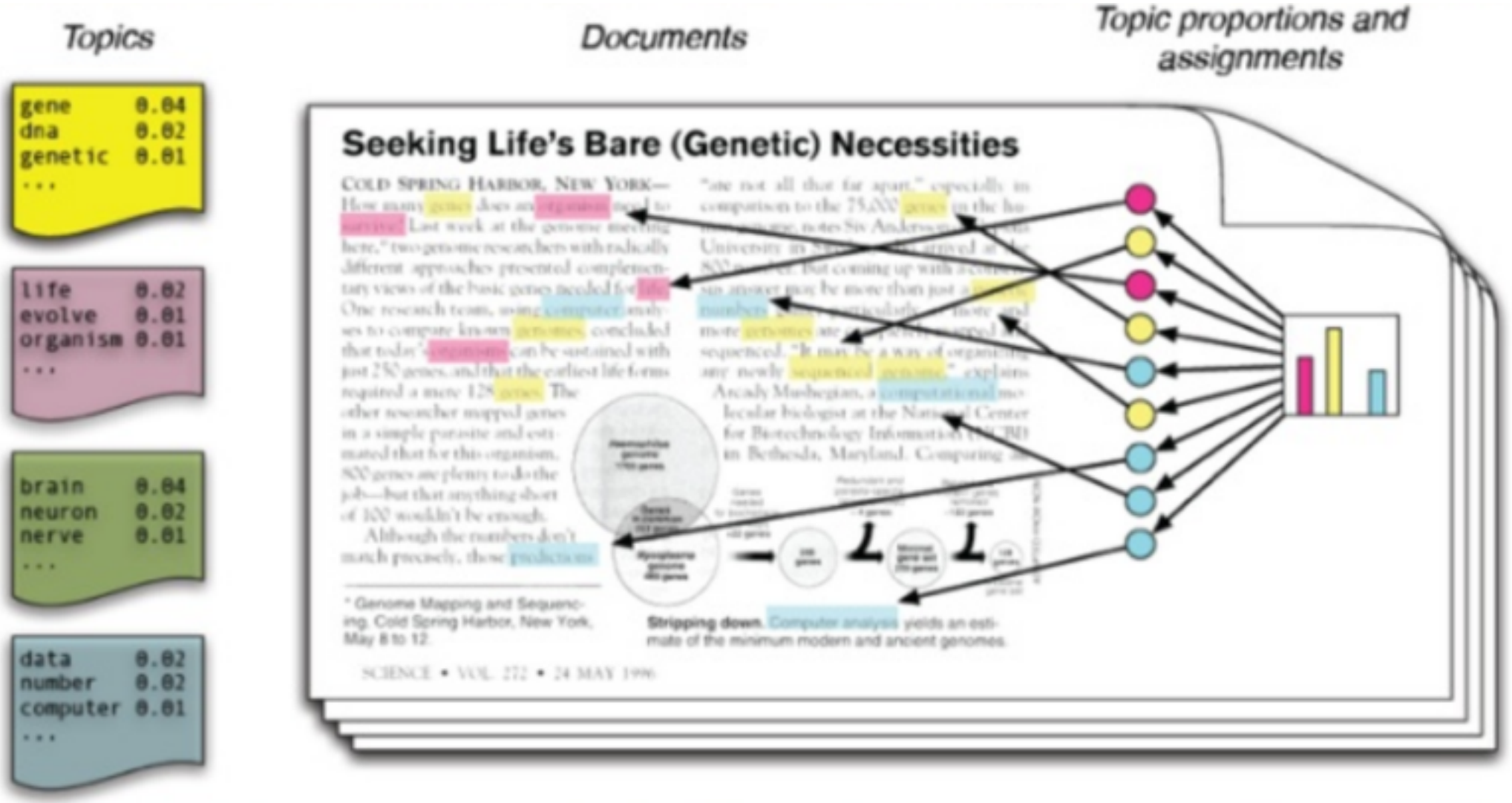
- given a target word
- predict a probability of context words

Word Embeddings: Analogies

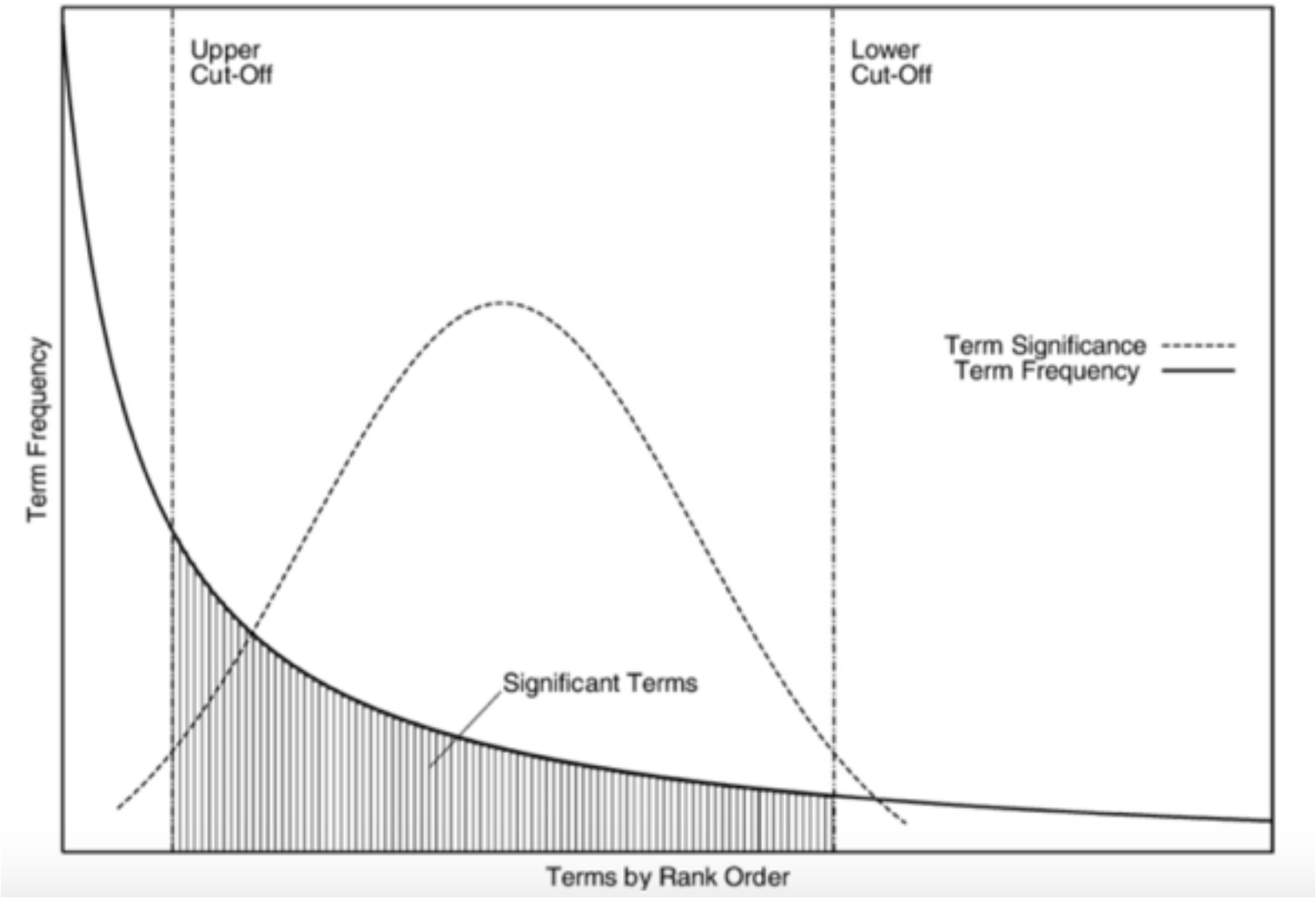




Topic Modelling



Zipf Distribution



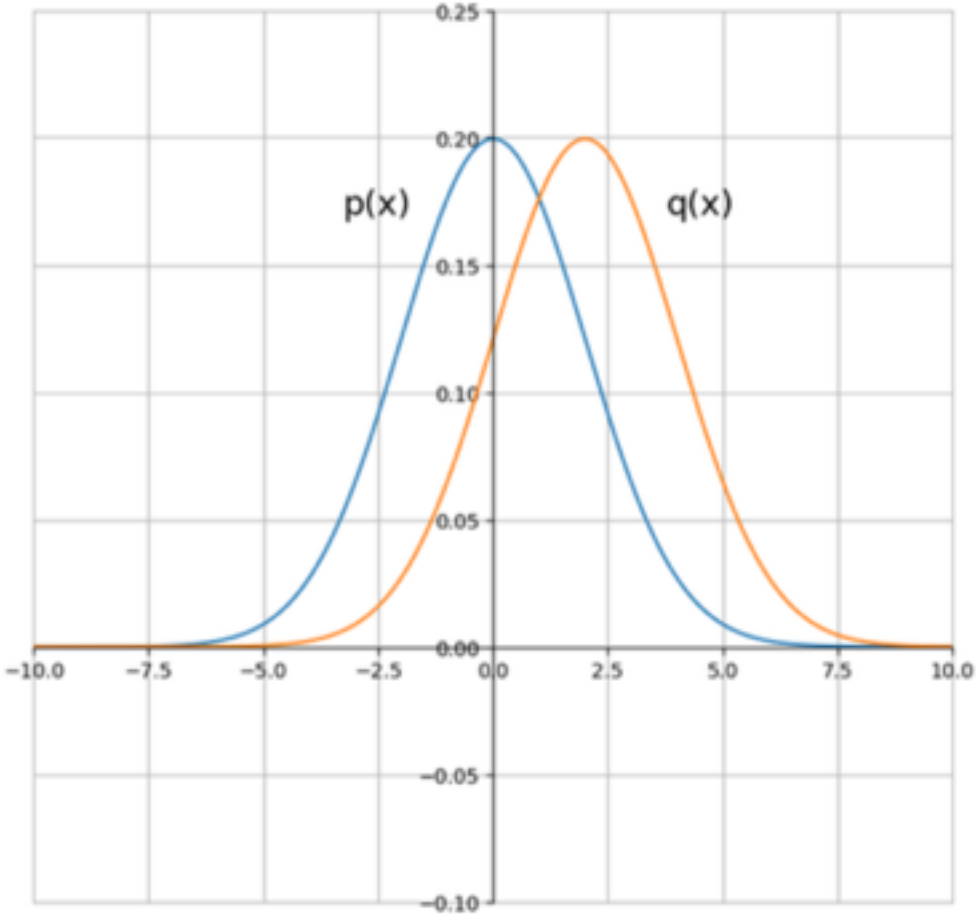
Intertextuality

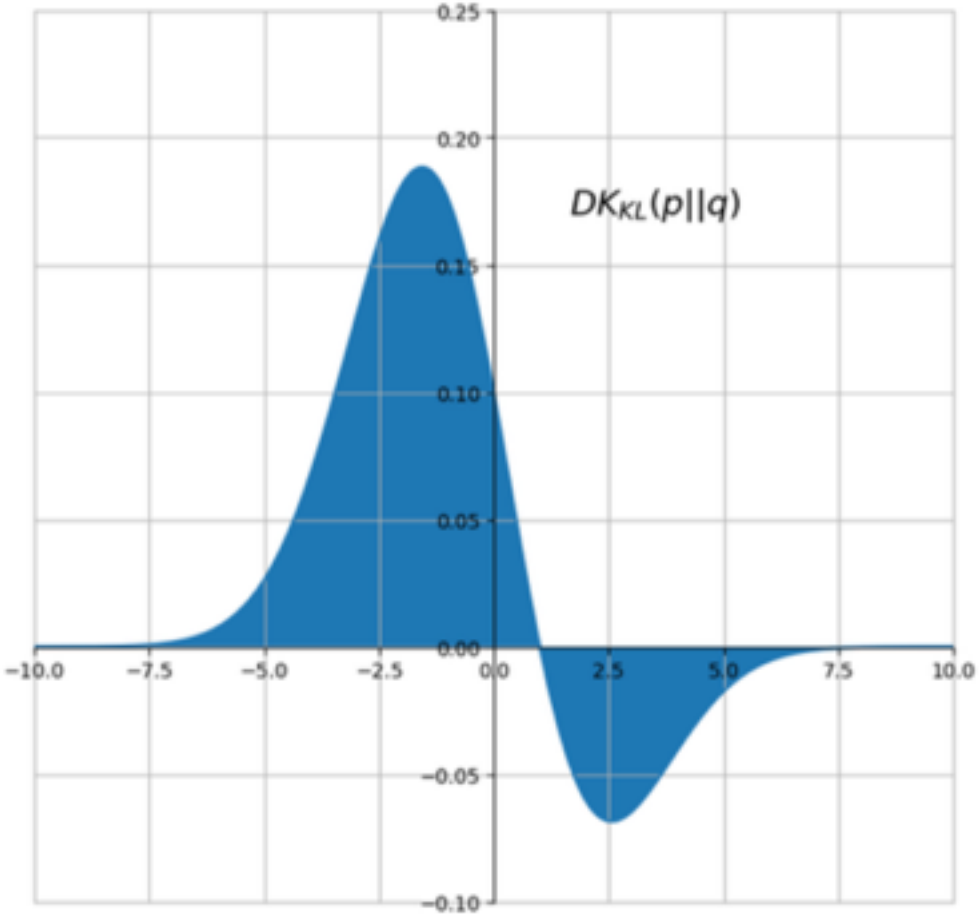
Demarcation of a passage

What is an allusion/marker?
-> can we provide a quantitative assessment?

How remarkable are certain influences/citations given language change?

Local and Global Similarity





Literal citation:

Ps 64:4a: אֲשֶׁר שָׁנְנוּ כַחֶרֶב לְשׁוֹנָם.

1QH^{a} V:13 [XIII:15]: ותצל נפש עני במעון אריות אשר שננו כחרב לשונם.

Free citation:

Ps 69:22: וַיִּתְּנוּ בְּבָרוּתִי רֹאשׁ וְלִצְמָאִי יַשְׁקוּנִי חֹמֶץ.

1QH^{a} IV[XII]:11–12: ויעצורו משקה דעת מצמאים ולצמאם ישקום חומץ.

Local and Global Similarity

(Isa 30:6) מַשָּׂא בַּהֲמוֹת נֶגֶב בְּאֶרֶץ צָרָה וְצוּקָה לָבִיא וְלַיִשׁ מֵהֶם אֶפְעֶה וְשָׂרָף מְעוֹפֵף

The burden of the beasts of the South. Through the land of trouble and anguish, from whence come the lioness and the lion, the viper and flying serpent.

בֵּיצֵי צִפְעוֹנִי בִּקֵּעוּ, וְקוּרֵי עַכָּבִישׁ יֶאֱרֹגוּ הָאֹכֵל מִבֵּיצֵיהֶם יָמוּת וְהַזּוּרֶה תִּבָּקַע אֶפְעֶה. (Isa 59:5)

They hatch basilisks' eggs, and weave the spider's web; he that eateth of their eggs dieth, and that which is crushed breaketh out into a viper.

Local and Global Similarity

(Job 20:16) רֹאשׁ-פְּתָנִים יִינָק תַּהַרְגֵהוּ לְשׁוֹן אֶפְעֶה

He shall suck the poison of asps; the viper's tongue shall slay him.

Local and Global Similarity

IIB1b For children have come up to the *throes* of death
(10) and the *mother* of a boy is distressed in her pains.
IIB1c For in the *throes* of death she gives birth to a son,
and in the pains of Sheol bursts forth (11) from the crucible of the
mother a wonderful counsellor with his might,
and a boy is delivered from the *throes*.

הרית גבר

IIB2a In his *mother* come quickly all (12) the *throes*
and PAINS OF AGONY[25] in their birth
and TERROR to their *mothers*;
IIB2(b) and in his birth all PANGS COME SUDDENLY
IIB2(b) (13) IN THE CRUCIBLE[26] of the *mother*
IIB2c And the *mother* of VANITY for AGONISING PAIN
and the *throes* of the pit for all WORKS of TERROR.

הרית אפעה