Bogazici University
Faculty of Engineering
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BİNÂRÎ

Poetry Generation System for Ghazals

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Tahammül mülkünü yıktın Hülâgû Hân mısın kâfir
Aman dünyâyı yaktın âteş-i sûzân mısın kâfir

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Problem Statement
An example ghazal

Tahammül mülkünü yıktın Hülâgû Han mısın kâfir
Aman dünyayı yaktın ateş-i sûzân mısın kâfir

Kız oğlân nâzı nâzın şehlevend âvâzı âvâzın
Belâsın ben de bilmem kız mısın oğlân mısın kâfir

Ne ma'nâ gösterir duşundaki ol âteşin atlas
Ki ya'ni şûle-i cansûz-ı hüsn ü ân mısın kâfir

Nedir bu gizli gizli âhlar çâk-i giribânlar
Aceb bir şûha sen de âşık-ı nâlân mısın kâfir

Sana kimisi cânım kimi cânânım deyü söyler
Nesin sen doğru söyle cân mısın cânân mısın kâfir

Şarâb-ı âteşinin keyfi rûyun şul'elendirmiş
Bu haletle çerâğ-ı meclis-i mestân mısın kâfir

Niçin sık sık bakarsın öyle mir'ât-ı mücellâya
Meğer sen dahi kendi hüsnüne hayrân mısın kafir

Nedim-i zârı bir kâfir esir etmiş işitmiştim
Sen ol cellâd-ı din ol düşmen-i îmân mısın kâfir
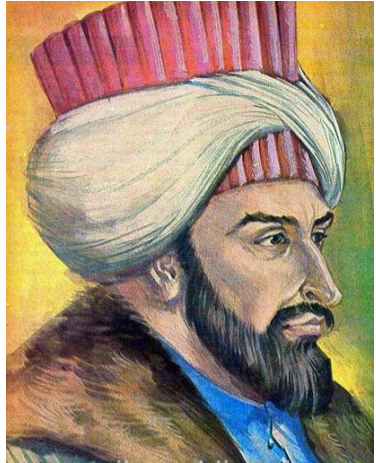
Nedîm

According to Manurung [2]:

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1. Grammaticality

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2. Meaningfulness

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1. Grammaticality
2. Meaningfulness
3. Poeticness

Semantic independence of couplets

Problem: Given a rhythmic metre and rhyming word(s) to use at the ending of lines, generate a couplet satisfying the criteria of grammaticality, meaningfulness and poeticness

▶ Small chunks of nonstandard data

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▶ Ottoman Text Archive [3] contains
  ▶ Poems of 3 poets: Mihrî, Necâtî and Revânî
  ▶ 9385 couplets in total
  ▶ 23161 distinct words
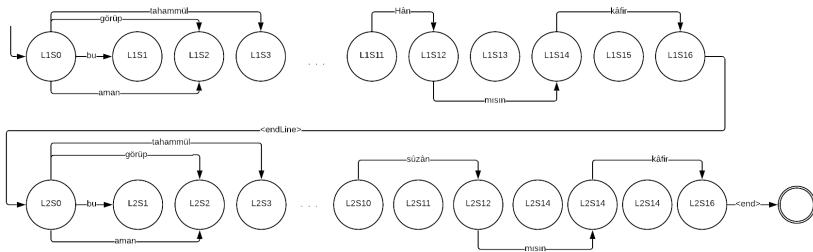
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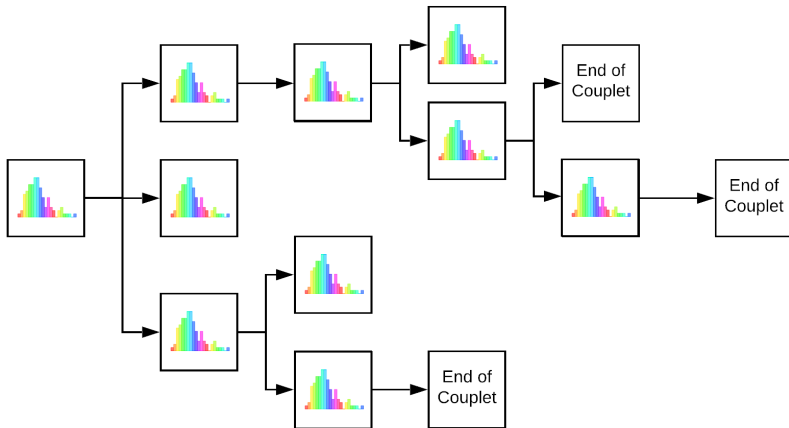
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1. Generate a finite state transducer(FST) to ensure poeticness
2. Train recurrent neural network(RNN) language model to ensure grammaticality and meaningfulness
3. Find high scoring paths on the FST using the RNN

► Variations on a single word produce many different words
► Use subword tokens: characters or syllables

Word Tokens: ["muḥabbet", "mülkünü", "yıḳdıñ", ...]

Syllable Tokens: ["mu", "ḥab", "bet", " ", "mül", "kü", ...]

Character Tokens: ["m", "u", "ḥ", "a", "b", "b", "e", "t", " ", ...]

Method
Differences from Hafez [1]

Due to scarce data, we use:

► 1 layer RNN with GRU units instead of 2 layer RNN with LSTM units
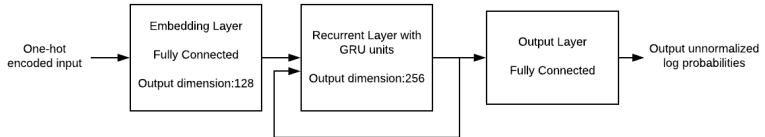
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One-hot encoded input → Embedding Layer, Fully Connected, Output dimension:128 → Recurrent Layer with GRU units, Output dimension:256 → Output Layer, Fully Connected → Output unnormalized log probabilities

▶ **Character Level Training**

	Rhyme Constraints: cān, sūzān	No Rhyme Constraints
500 epochs	ne it ḫūbān-ı ḫiffet zevḳı ḫiffet mehliḳā-yı cān ki ṭoz ḫiffet idin 'ışḳumda 'ışḳum 'ışḳunuñ sūzān	ḳu-ı 'ışḳıñ diyen ḫōrşīdden ḫōrşīd 'ışḳumda ki ḫaṭ ḫoşdem-i içsem 'ışḳunuñ ḫorşīd 'ışḳumda
1000 epochs	ne ḫoş-ı faḫr ḫayrān eyleyüp şeydālanursın cān bu ḫaṭ-ı ḫaşm ḳoc ḫūbān ḳoyub-ı vaṣldan süzān	bu ḫūn-ı ḫışm-ı ḫūbān felekler gülbeşekkerdür ne ḫōş ḫūbān-ı ḫayrān ḫayr-ı maḥmūd ibrām

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▶ **Syllable Level Training**

	Rhyme Constraints: cān, sūzān	No Rhyme Constraints
500 epochs	şu -ı -ı derc akşemseddinüñ ekşitdügüñden cān ne boş ir ʿışḳdur efsāne akşemseddinüñ sūzān	bu az baġdāddan ekşitdügüñden ābdāruñdan bu ur güstāḫlıḳ maʿmūresinden bīsaʿādetler
1000 epochs	ye boş illāh akşemseddinüñ ekşitdügüñden cān ḳo zehrālüd illaʾllāh müşgāsāsıdur sūzān	bu ḥad-ı fenn akşemseddinüñ ḫōrşīdruḫsārı di boş aġyāra şekkerrīzden ḫōrşīdruḫsār

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- ▶ FST with word vocabulary ensures all used words are legitimate
- ▶ Construct FST with syllables.
- ▶ Possibility of grammatical novelty.
- ▶ Possibility of using nonexistent words.

	Rhyme Constraints: cān, sūzān	No Rhyme Constraints
500 epochs	ki gūyā mülkiçün bāleb-i pürçünkim ḳalis-i cān şafaḳdur ḫāne-i devlet serāser mest-i sūzān	bu ṭūbā çünki şol kim gül çerāzın bezmümüzdüb ḳış şa-yı miḥnet anuñ kim anmazın ancaḳ kemer dirler
1000 epochs	eger çün seyr hey hey bezmhānuñçün benümçün cān yiyā ṭāvūsdur gülgün şabā olmış berā sūzān	ʿaceb mül teşnedir kāfir muḳılmaḳ etdi gerlārī ʾacebdür bir ḳadem şanmañ anuñ efsānedür dirler

- ▶ Meaningfulness and grammaticality are generally not satisfied.
- ▶ RNN training captures some details of the data
- ▶ Data is very limited.
- ▶ Model is very basic.

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Future Work

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▶ Assuming there is enough data:
  ▶ Word embeddings instead of a fully connected layer
  ▶ More sophisticated RNN architecture
  ▶ Morphological analysis or similar NLP tools to account better for the agglutinative structure of the Turkish language

[1] Marjan Ghazvininejad et al. "Generating topical poetry". In:
     Proceedings of the 2016 Conference on Empirical Methods in
     Natural Language Processing. 2016, pp. 1183–1191.

[2] Hisar Manurung. "An evolutionary algorithm approach to poetry
     generation". In: (2004).

[3] *Ottoman Text Archive Project*. URL:
     http://courses.washington.edu/otap/.

Thank you!