



USING BIOINFORMATIC ALGORITHMS TO ANALYZE THE POLITICS OF FORM IN MODERNIST URDU POETRY

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DH2015

June 31, 2015

Code: [https://github.com/seanpue/
dh2015](https://github.com/seanpue/dh2015)

Code

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Graphics: [https://github.com/seanpue/dh2015/blob/master/
Graphics.ipynb](https://github.com/seanpue/dh2015/blob/master/Graphics.ipynb)

Talk Layout

- Research Problem
 - In a field dominated by literary history and studies of semantic meaning, how to incorporate other formal qualities, including sound, in analysis of Urdu poetry
 - Motivated choice to analyze the meter of Urdu poetry, both classical and free verse
- Method
 - Working with graph-based algorithms developed in conjunction with bioinformaticians
- Results
 - Application to the modernist poetry of Sana Ullah Dar ‘Miraji’ (1912–49) reveals abstractions from two metrical systems, one Perso-Arabic and one Indic
- Conclusion
 - Further applications and research possibilities

Why Digital Analysis for Urdu?

- Motivated by the strong and recurrent discourse about ‘sound’ in modern Urdu poetry
- Urdu as a language involves:
 - Perso-Arabic vocabulary and forms (ghazal, masnavi, etc.)
 - Indic (“Hindi”) vocabulary and forms
- Relation of meter to community
- Possibilities of providing experiential or graphical “proof” to prose assertions

Urdu Meter

- The meters are quantitative (not qualitative), based on length rather than stress
- Units involve “short” and “long” vowels
- Metrical units are not necessarily syllables
 - E.g. Raaj → = - (raa j) [where = is long, - is short]

Flexibility

- Long vowels can be shortened at the end of words
- Metrical units can span words
- There are particular word-based anomalies/flexibilities

Urdu Prosody

- Descriptions in Urdu from Persian (Farsi) and earlier Arabic prosody, as following a particular pattern (dates back to al-Khalil of Basra (718 CE))
- Describe metrical feet using text where certain vowels are “moving” or “silent,” e. g.

fā ‘ilātun = - = = فاعلَتْن

fā ‘ilun = - = فاعلن

fa ‘ūlan - = = فعالن

- Meters named using primary metrical “wheels” and different sorts of modifications to them
- Meter is referred to as a *baḥr* (“ocean”)

Metrical Examples

	=	-	=	=	=	-	=	=	=	-	=	=	=	-	=
Line 1	naq	sh	far	yaa	dii	hai	kis	kii	sho	;xii	-e	ta;h	rii	r	kaa
Line 1 IPA	nəq	/ʃ/	fər	ja:	dɪ:	hɛ-	kɪs	kɪ:	ʃo:	xi-	e:	təh	rɪ:	r	ka:
Line 2	kaa	;ga	;zii	hai	pai	ra	han	har	pai	ka	r-e	ta.s	vii	r	kaa
Line 2 IPA	ka:	ɣə	zɪ:	hɛ:	pɛ:	rə	hən	hər	pɛ:	kə	re:	təs	vɪ:	r	ka:

نقش فریادی ہے کس کی سوخی تحریر کا
کاغذی ہے پیر بن بر پیکر تصویر کا

Computational Problem

How to computationally scan Urdu poetry in a scalable and effective way?

Collaborators

C. Titus Brown
(@ctitusbrown)



“developmental biology, next-gen sequence analysis, metagenomics, and software engineering.”

Tracy K. Teal
(@tracykteal)



“Microbial ecologist, bioinformatician, collector of soils. OpenScience and tab-complete advocate.”

Transfer of sequences that encode information

The Central Dogma of Molecular Biology

DNA AAGGAATCATATGGATAC

Urdu

رنج سے خو گر ہوا انساں

Replication

DNA AAGGAATCATATGGATAC

Transliteration ranj se ;xuugar hu))aa insaa;n

Transcription

RNA AAGGAAUCAUAUGGAUAC

Metrical components

csc cbcv bcv csc bcsc cv bscc vn

Parsing

RNA codons AAG GAA UCA UAU GGA UAC

Group components

csc c bcv bcv csc bcs cv sc cvn

Translation

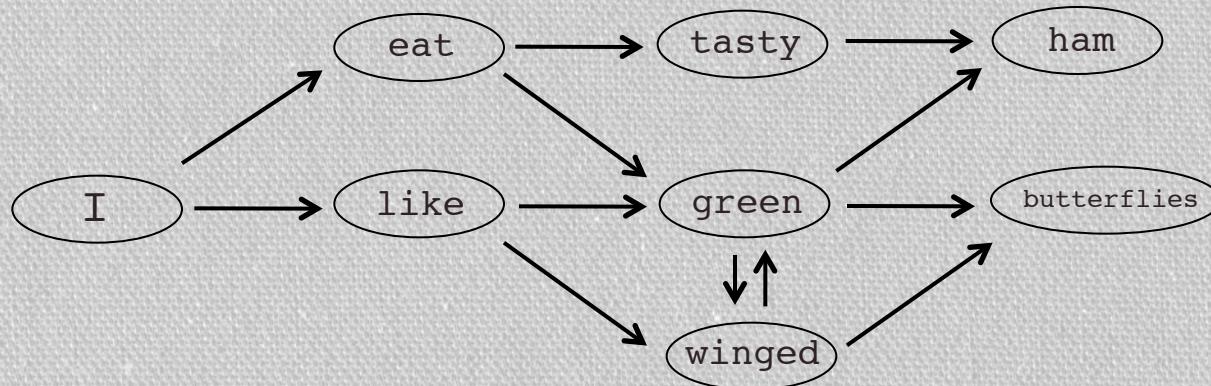
Protein KESTGT

Scansion ==---/==---/==---

Representations of sequences

Markov chain

A mathematical system that undergoes transitions from one state to another, between a finite or countable number of possible states



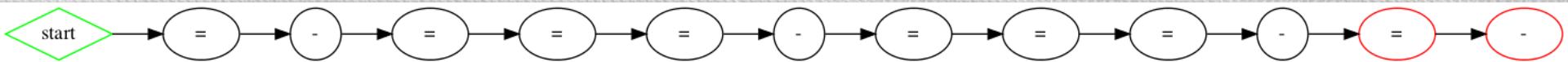
Find the best transition state trajectory

Meters as Graphs

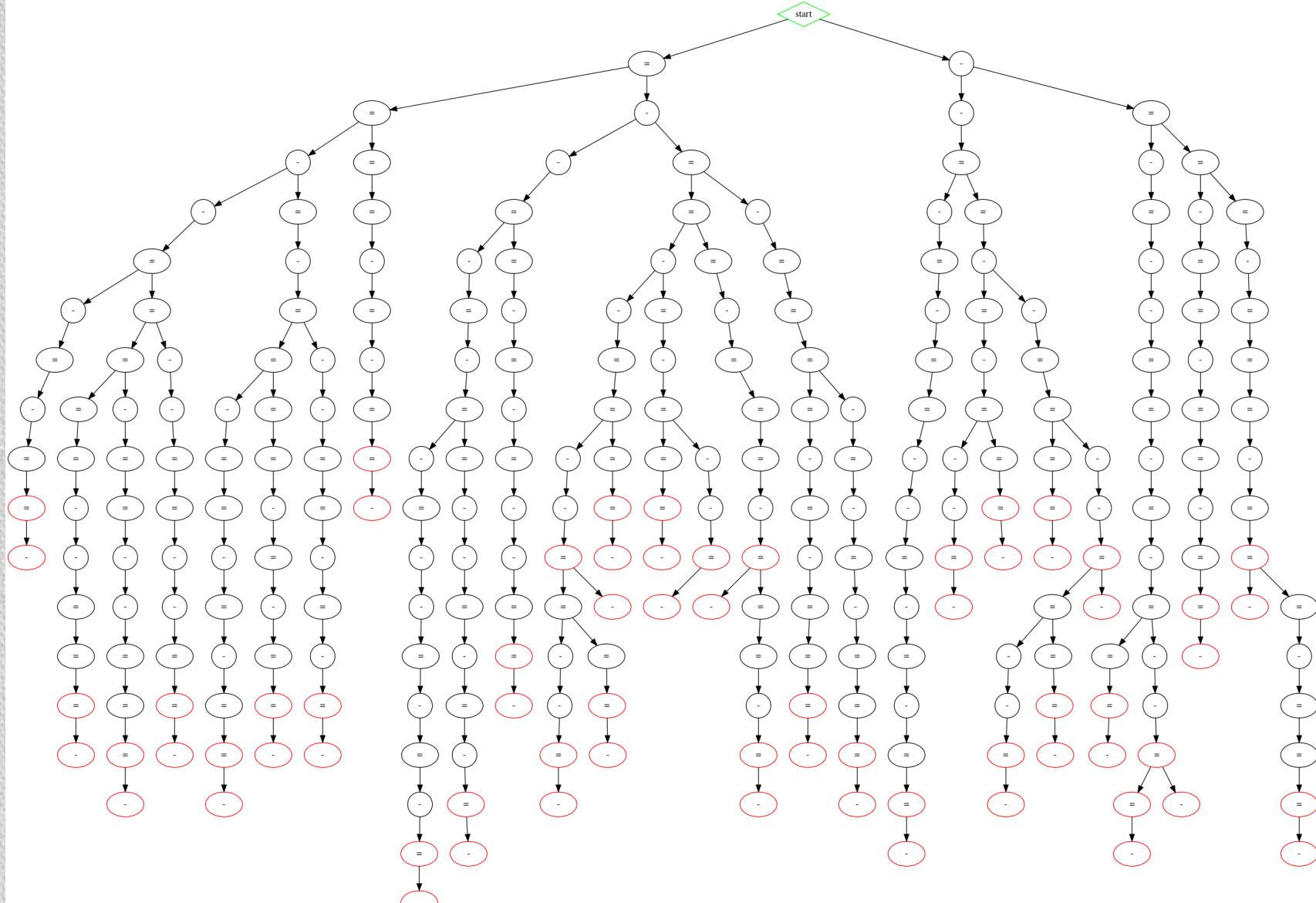
Nodes represent metrical units
(oval = is long, short – is circle); red is end position

Edges contain constraints, disallowing invalid combinations

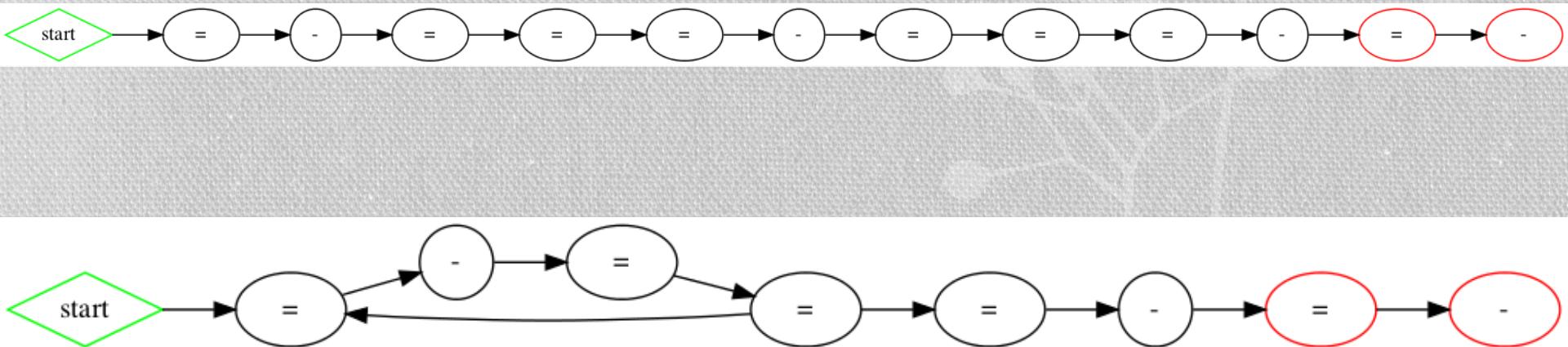
Example: = - = = / = - = = / = - = (-)



“Classical” meters of Mirza Ghalib (d. 1869)



Transformation of “Classical” to “Free” Verse



Sana Ullah Dar Miraji (1912-49)



- *Miraji ki nazmen*, 1944
- Claims to embrace a past that is not Indo-Muslim
- Drawn to ancient India, gopis, Krishna
- Heart focused on Hindu Indian past, eyes focused on the world around him
- Extraordinary legacy for modern and contemporary Urdu poets, as a poet of Hindustani (before Hindi and Urdu were separated)

Prosody of Miraji ki nazmen 1

- (--- /)+ ---(~) {1 Poem}
- [--- /]+ ~-(~){1 Poem}
- [--- / --]+ {6 poems}
- [---- /]+ {3 poems}
- [--- /]+ {3 poems}
- ---/ (---)+/ --- {1 poem}
- ---- / (--- /)+ [--- | --](~) {11 Poems}
- [--- /]+ (~) {3 poems}
- [--- /]+ {1 poem}

All abstractions from ghazal (Perso-Arabic) meters

Prosody of Miraji ki nazmen, 2

- However, a separate metrical pattern in 18 poems that does not follow Perso-Arabic meters, but is based on total count of metrical units, usually following a pattern of:

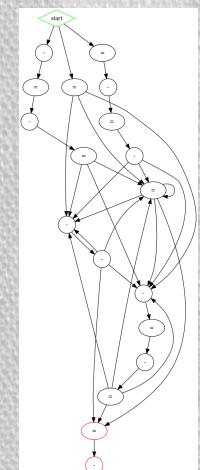
= [= | - -] = (-)

With other variants:

- - = [= | - -] = (-)

= [= | - - -] = (-)

	text	scan	count
0	bas dekhaa aur phir bhuul gayaa	=====	16
1	jab ;husn nigaa; n me;n aayaa	=====	16



Closer to the *mātrik chhand* (mora-based meters of Hindi); though uses the metrical-unit rules of Urdu

Also a few adaptations of Braj Bhasha (early Hindi) forms as well

Closest parallel in Mir's “Hindi Meter”

- Mir Taqi Mir (1722-1810)

Earlier examples as well:

- 'Alī Ādil Shāh II 'Shāhī' (r. 1656-1672, Bijapur)
- Mīr Muḥammad Ja‘fr ‘Zaṭallī (1659?-1713?, Haryana and Delhi)
- Shāh ‘Imād-ud Dīn Qalandar Phulvārvī (1654-1712)

Secondary Metrical System

- Does not align easily with the Perso-Arabic prosody, but has a larger presence in the modernist Urdu canon, as well as arguably the classical as well
- A different sort of aahang (melody) to what gets canonized as the separately “Perso-Arabic”/Muslim metrical system of Urdu
- Points to the common musical/rhythmic understanding of Hindi and Urdu

Possibilities for Computational Analysis

- 1. A model of how poem should sound in meter, that can be visualized in different ways.

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- 1. A model of how poem should sound in meter, that can be visualized in different ways.
- 2. Correlation with performance.
 - Determining role of stress, which remains elusive.
- 3. Discerning patterns in sound, comparison across languages and in relation to music.
- 4. On a macro level, mapping of the evolution of poetic forms, including free verse, across languages.
- 5. Cultural heritage preservation—making annotated texts and performances available and open to new discoveries, both scholarly and creative.