Listening to Biological Translation: Converting RNA to Music

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Histidine	CAU, CAC	C
Isoleucine	AUU, AUC, AUA	C#

Abstract

The sonification of genetic material is a little-explored mode of unconventional computation that bridges the divide between bioinformatics, computer science, and music, allowing bioinformaticians to perceptualize their data in a novel and illuminating manner. This paper presents BioMus, an original model for converting RNA to musical data in the form of MIDI piano chords. Genetic material from a variety of species is sourced from Entrez, a molecular biology database system of the NCBI. Then, codons inform the harmony in protein-coding regions, while individual nucleotides dictate chords in non-coding regions. Local keys are determined by amino acids in the protein-coding regions and carry over into the non-coding regions. Finally, an analysis of harmonic sequences in the resulting MIDI files is presented, as well as an attempt to classify species into the correct biological class based on this data. By mapping nucleotides and codons to chords and analyzing genetic material as music, BioMus thus gives scientists the means to uniquely conceptualize the process of biological translation.

ONE PARAGRAPH, max 250words

Introduction

Related Work

Ingalls et al. present

Converting DNA to Music

Histidine	CAU, CAC	C	} Essential
Isoleucine	AUU, AUC, AUA	C#	
Histidine	CAU, CAC	C	} Nonessential
Isoleucine	AUU, AUC, AUA	C#	
Histidine	CAU, CAC	C	} Conditionally Essential
Isoleucine	AUU, AUC, AUA	C#	

Aardvark Armenia
Elephant Ethiopia } Things beginning with vowels

Things beginning with consonants:
{ Platypus Portugal
Zebra Zimbabwe

Obtaining Genetic Data

Conversion to MIDI

Analyzing MIDI for Harmonic Sequences

Classification and Musicality of Species

Conclusion

Acknowledgments