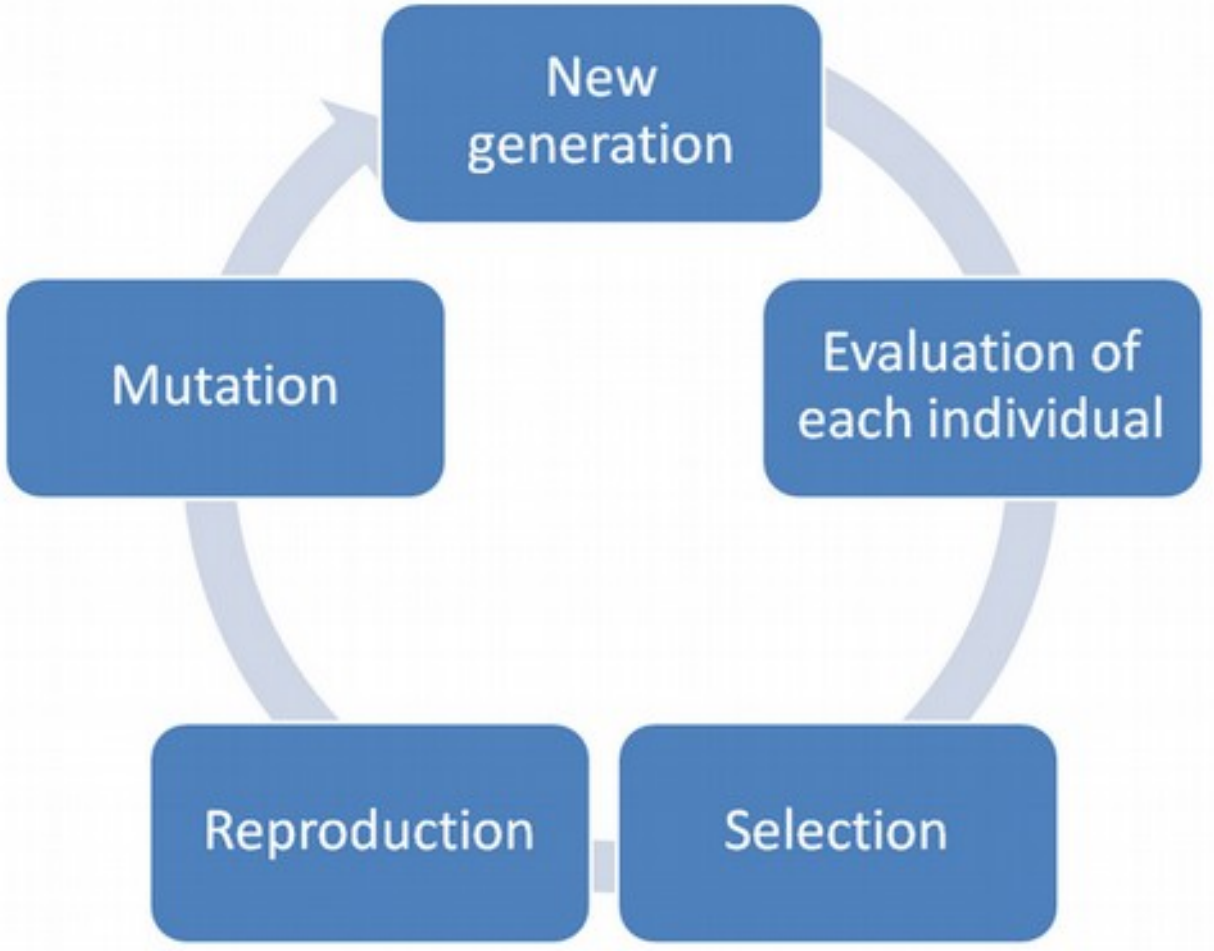
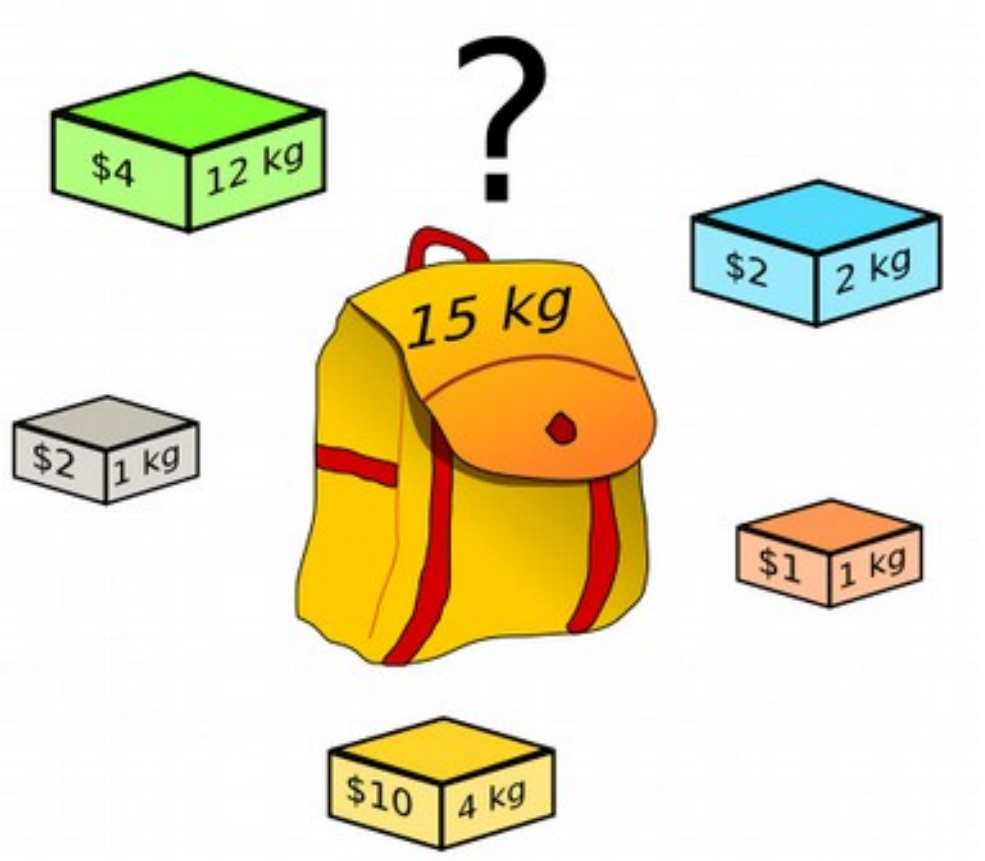
Genetik Algoritmalar

&

Yapay Zeka


New generation
Evaluation of each individual
Selection
Reproduction
Mutation



https://blog.sicara.com/getting-started-genetic-algorithms-python-tutorial-81ffa1dd72f9

fitness score = (number of char correct) / (total number of char)

```
def fitness (password, test_word):

    if (len(test_word) != len(password)):
            print("taille incompatible")
            return
    else:
            score = 0
            i = 0
            while (i < len(password)):
                    if (password[i] == test_word[i]):
                            score+=1
                    i+=1
            return score * 100 / len(password)
```

Fitness

```python
import random

def generateAWord (length):
	i = 0
	result = ""
	while i < length:
		letter = chr(97 + int(26 * random.random()))
		result += letter
		i +=1
	return result

def generateFirstPopulation(sizePopulation, password):
	population = []
	i = 0
	while i < sizePopulation:
		population.append(generateAWord(len(password)))
		i+=1
	return population
```

Evolution

```python
import operator
import random

def computePerfPopulation(population, password):
	populationPerf = {}
	for individual in population:
		populationPerf[individual] = fitness(password, individual)
	return sorted(populationPerf.items(), key = operator.itemgetter(1), reverse=True)

def selectFromPopulation(populationSorted, best_sample, lucky_few):
	nextGeneration = []
	for i in range(best_sample):
		nextGeneration.append(populationSorted[i][0])
	for i in range(lucky_few):
		nextGeneration.append(random.choice(populationSorted)[0])
	random.shuffle(nextGeneration)
	return nextGeneration
```

Selection

```python
import random

def createChild(individual1, individual2):
	child = ""
	for i in range(len(individual1)):
		if (int(100 * random.random()) < 50):
			child += individual1[i]
		else:
			child += individual2[i]
	return child

def createChildren(breeders, number_of_child):
	nextPopulation = []
	for i in range(len(breeders)/2):
		for j in range(number_of_child):
			nextPopulation.append(createChild(breeders[i], breeders[len(breeders)
	return nextPopulation
```

Breeding

Package GA

source code

Genetic Algorithm library (DEPRECATED).

Submodules

- **Bio.GA.Crossover**: *Support for crossovers in the Genetic Algorithms module.*
  - **Bio.GA.Crossover.General**: *General functionality for crossover that doesn't apply.*
  - **Bio.GA.Crossover.GeneralPoint**: *Generalized N-Point Crossover.*
  - **Bio.GA.Crossover.Point**: *Perform two-point crossovers between the genomes of two organisms.*
  - **Bio.GA.Crossover.TwoPoint**: *Perform two-point crossovers between the genomes of two organisms.*
  - **Bio.GA.Crossover.Uniform**: *Perform uniform crossovers between the genomes of two organisms.*
- **Bio.GA.Evolver**: *Evolution Strategies for a Population.*
- **Bio.GA.Mutation**: *Support for mutations in the Genetic Algorithms module.*
  - **Bio.GA.Mutation.General**: *General functionality for mutations.*
  - **Bio.GA.Mutation.Simple**: *Perform Simple mutations on an organism's genome.*
- **Bio.GA.Organism**: *Deal with an Organism in a Genetic Algorithm population.*
- **Bio.GA.Repair**: *Methods for performing repairs that will Stabilize genomes.*
  - **Bio.GA.Repair.Stabilizing**: *Methods for performing repairs that will Stabilize genomes.*
- **Bio.GA.Selection**: *Support for selections in the Genetic Algorithms module.*
  - **Bio.GA.Selection.Abstract**: *Base selection class from which all Selectors should derive.*
  - **Bio.GA.Selection.Diversity**: *Select individuals into a new population trying to maintain diversity.*
  - **Bio.GA.Selection.RouletteWheel**: *Implement Roulette Wheel selection on a population.*
  - **Bio.GA.Selection.Tournament**: *Provide Tournament style selection.*

makina ve zeka tanımları üzerinde anlaşamıyorsak...

ya da...

Bu pöstekiyi bizim yerimize,
en az bizim kadar iyi sayabilecek
birilerini bulsak...

Yapa Zeka Bilgisayarın zeki insan davranışını taklit etmesini sağlayan teknikler...

(Hedeflenen işi en az insan kadar iyi yapabilen makinalar)

Makine öğrenmesi Makinanın doğrudan / açıkça programlanmadan bir davranışı göstermesi

Deneyimlerden -eğitim verisetlerinden- istatiksel yöntemler ile çıkarımlar yapmak

Denetimli

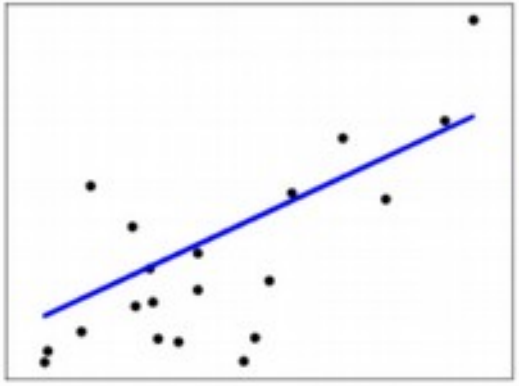
Yarı denetimli

Denetimsiz

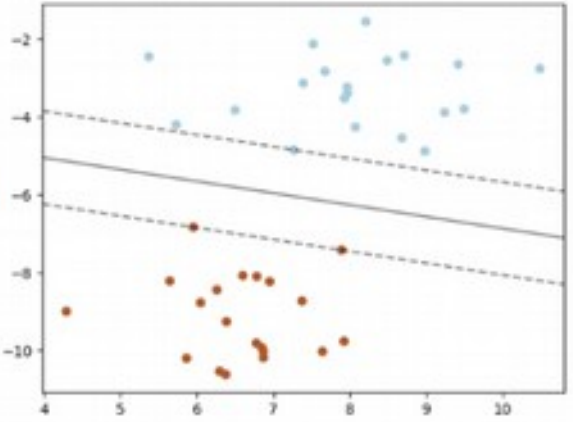
Derin öğrenme

- Dünyayı, kavramların yuvalanmış hierarşisi olarak temsil etmeyi öğrenmeyi içerir
- Her kavram için, daha basit bir kavram ile ilişki tanımlanır
- Daha soyut kavramlar, daha basit olanların terimleri ile ifade edilmiş olur.

Denetimli öğrenmede:

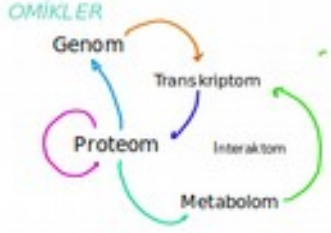


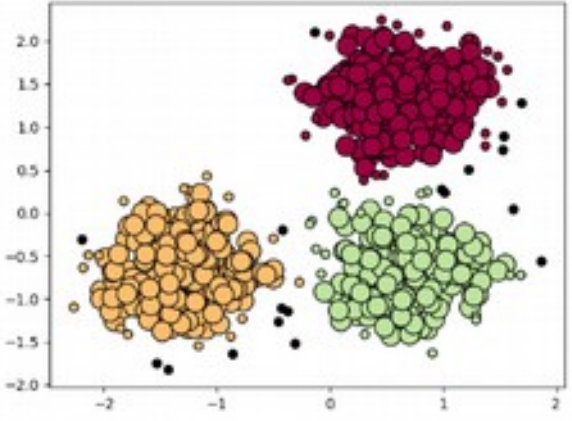
Regresyon



"Support Vector Machine"

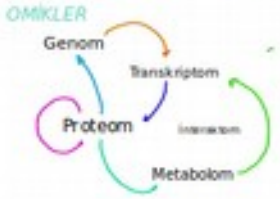
$$Y = f(X)$$

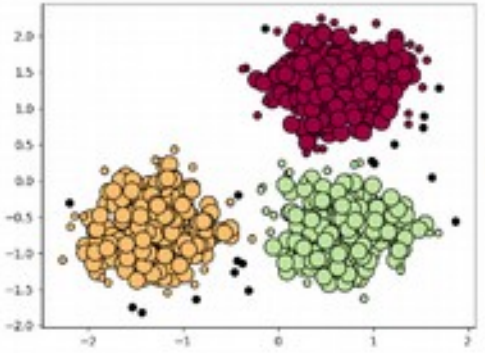




Kümeleme

Y = f(X)



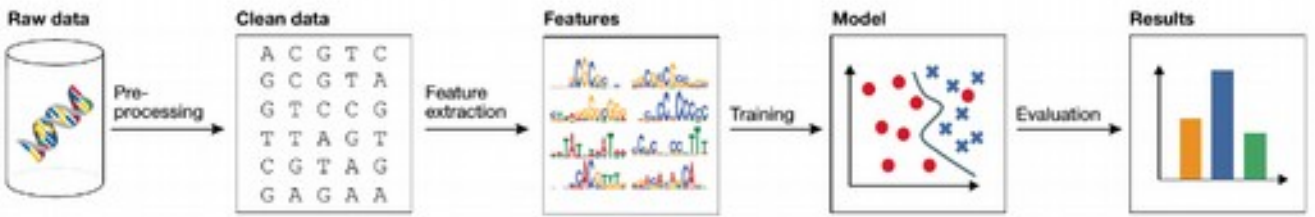


Kümeleme

Sınıf = f(özellikler)

Karar ağaçları
Veri setini *özelliklerine* göre sınıflandırmak

"Random Forest"
- Eğitim veri setinden rassal olarak hazırlanan alt veri setleri için karar ağaçları oluşturulur.
- SONUÇ: Karar ağaçlarının çoğunluğunun verdiği sınıflama



Makinamıza "öğretmenlik" yapmak
her zaman kolay olmayabilir!

Denetimsiz öğrenmede:

$$Y = f(X)$$

Kümeleme

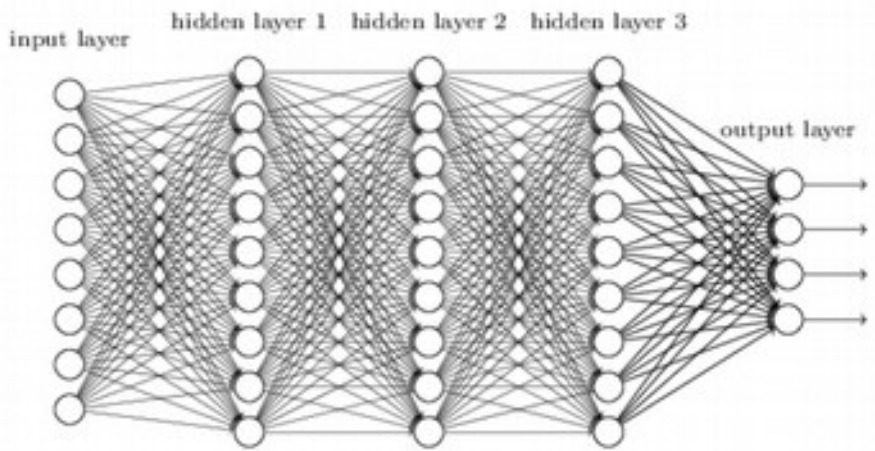
Eşleştirme

PCA

...

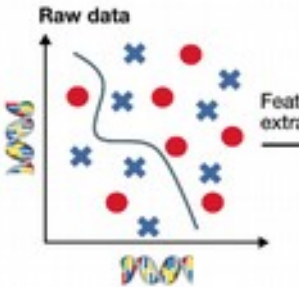
Derin öğrenmede:

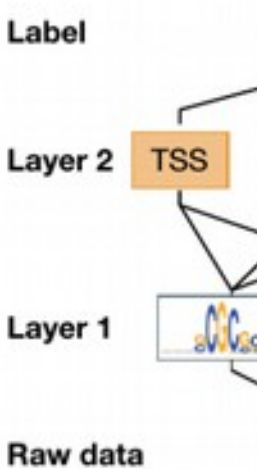
biyolojik beyindeki nöronal örüntüden esinlenerek:



Giriş veri seti

Çıktı





Somut özelliklerin ilişkilendirildiği ağ katmanları

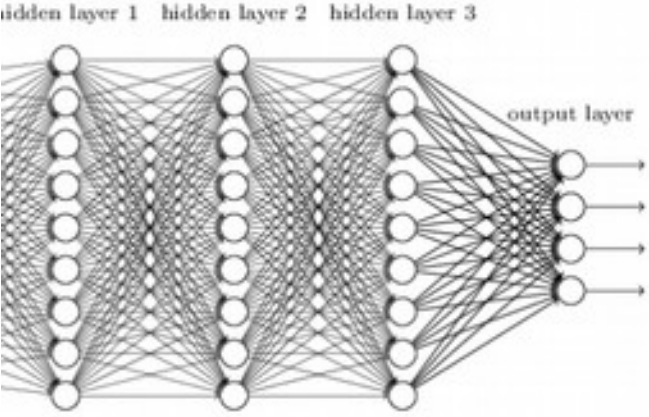
Soyut özelliklerin tanımlanması

Somut özellikleri kodlayan "nodların" ilişkilendirilmesi

Angermueller, Chris
Parts, and Oliver St

ğrenmede:

ki nöronal örüntüden esinlenerek:

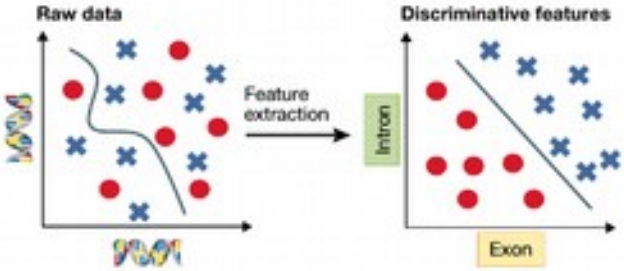


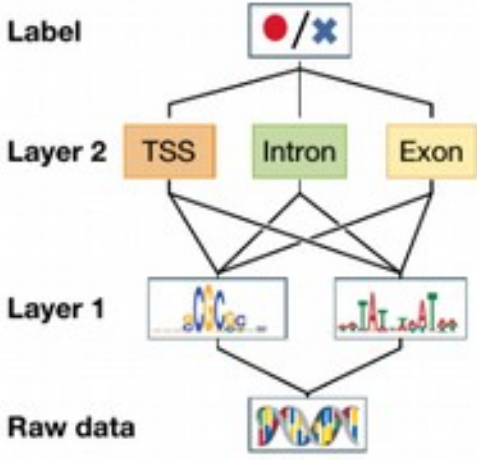
Çıktı

erin
i ağ

Soyut özelliklerin tanımlanması

omut özellikleri kodlayan
nodların" ilişkilendirilmesi





Angermueller, Christof, Tanel Pärnamaa, Leopold Parts, and Oliver Stegle. 2016. “Deep Learning for Computational Biology.” Molecular Systems Biology 12 (7). https://doi.org/10.15252/msb.20156651.

Gen e

Metag
çeşitli

Gen re

Mutas
tahmi

Ekzon

De no
bölgel

Gen ekspresyon farklılıklarının bulunması

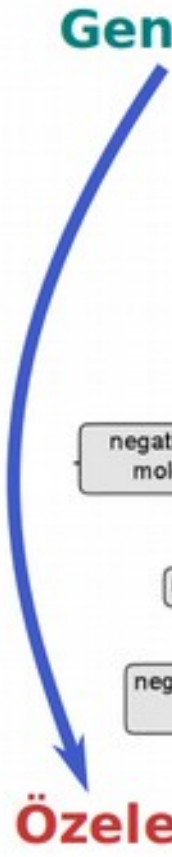
Metagenomlardaki tür ve metabolizma çeşitliliğinin saptanması

Gen regülasyon ağlarının keşfedilmesi

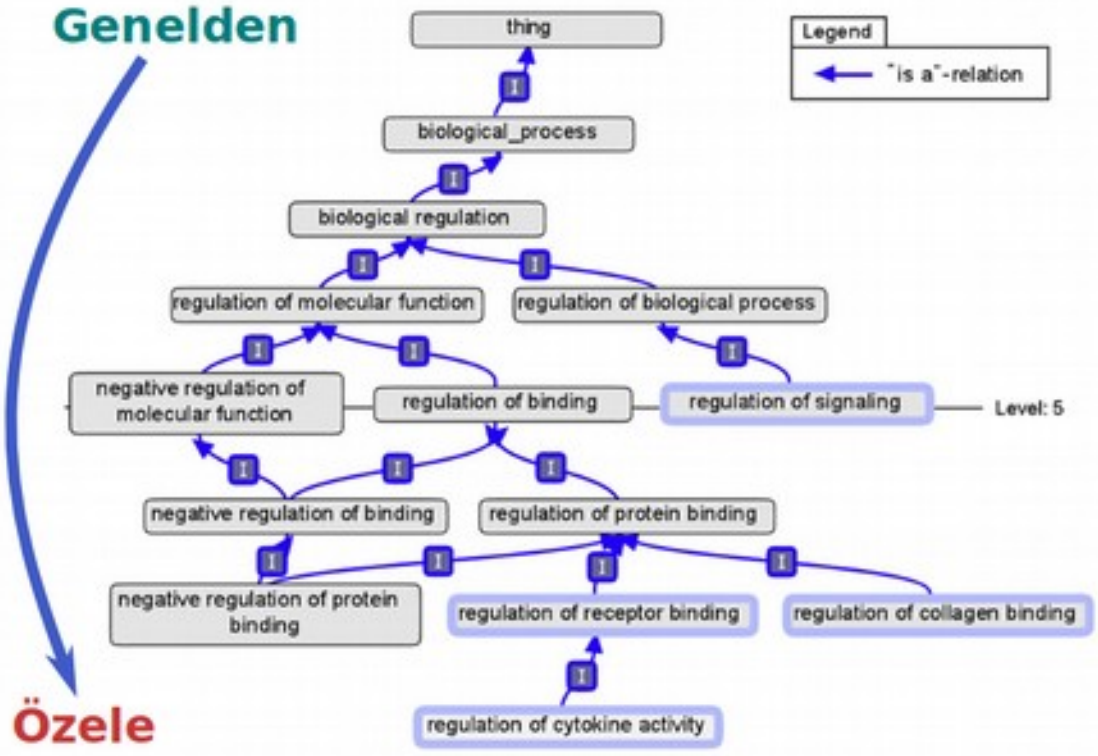
Mutasyonların oluşturableceği muhtemel etkilerin tahmin edilmesi

Ekzon - intron bileşkelerinin bulunması

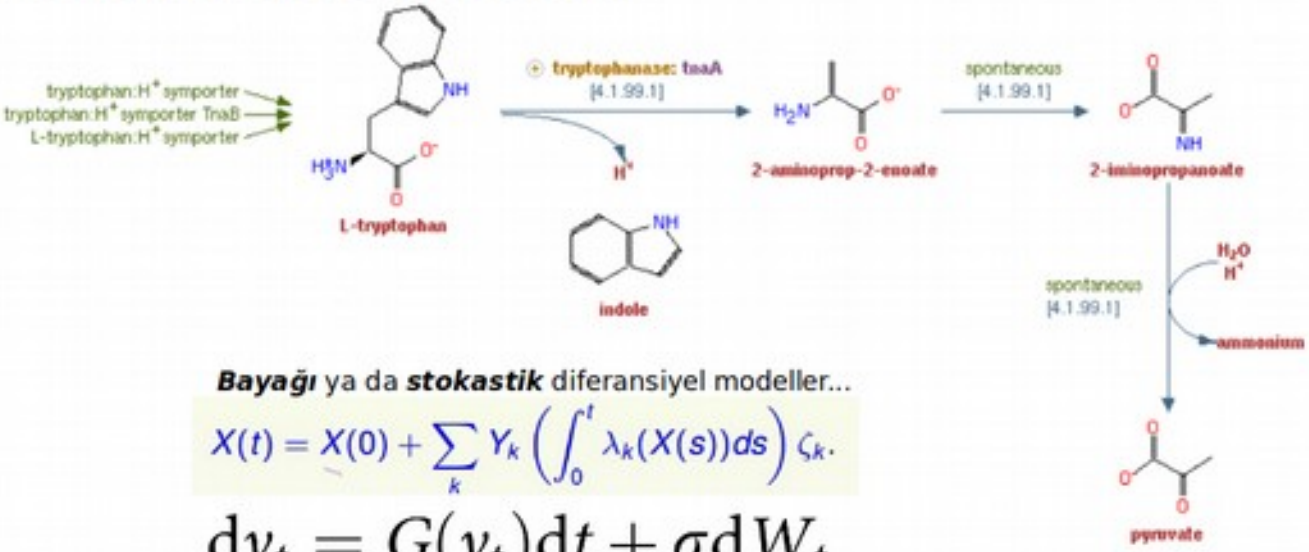
De novo genom projelerinde gen kodlayan bölgelerin bulunması



OBO Foundry


Genelden
Özele
thing
Legend
"is a"-relation
biological_process
biological regulation
regulation of molecular function
regulation of biological process
negative regulation of molecular function
regulation of binding
regulation of signaling
Level: 5
negative regulation of binding
regulation of protein binding
negative regulation of protein binding
regulation of receptor binding
regulation of collagen binding
regulation of cytokine activity

Simülasyon: Mühendislik paradigmasının en önemli bileşenlerinden biri...



Bayağı ya da ***stokastik*** diferansiyel modeller...

$$X(t) = X(0) + \sum_k Y_k \left(\int_0^t \lambda_k(X(s))ds \right) \zeta_k.$$

$$\mathrm{d}y_t = G(y_t)\mathrm{d}t + \sigma \mathrm{d}W_t$$

ya da **kural tabanlı** karar ağaçları