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**ЎЗБЕКИСТОН РЕСПУБЛИКАСИ
ОЛИЙ ВА ЎРТА МАХСУС
ТАЪЛИМ ВАЗИРЛИГИ**

НАМАНГАН ДАВЛАТ УНИВЕРСИТЕТИ ИЛМИЙ АХБОРОТНОМАСИ

НАУЧНЫЙ ВЕСТНИК НАМАНГАНСКОГО ГОСУДАРСТВЕННОГО УНИВЕРСИТЕТА

2021 йил махсус сон

```
46f579767ac09b450307bde7bcfb9522c024f68443320b5478b7434bf8b35a5cbbd
5ec17ff1b5593dd94a9b29abfc7792ebcac20ce80e8017cb3dfb01eccb8c01
>>>
```

BLAKE2 dayjestlar uchun turli uzunliklarda (BLAKE2b uchun 64 baytgaca, BLAKE2s uchun 32 baytgacha) bo'lishi mumkin.

```
from hashlib import blake2b
h = blake2b(digest_size=30)
h.update(b'Salom Python')
print(h.hexdigest())
```

```
ef400321e2a23cadc423164f9bc006a43bfcc2d69b2a282e0aac376e469e
>>>
```

Turli hajmdagi xeshlash obyektlarining chquvchi dayjestlari turlicha bo'ladi:

```
from hashlib import blake2b
print(blake2b(digest_size=10).hexdigest())
print(blake2b(digest_size=11).hexdigest())
```

```
6fa1d8fcfd719046d762
eb6ec15daf9546254f0809
>>>
```

Foydalanilgan adabiyotlar ro'yhati

1. hashlib - безопасные хэши и дайджесты сообщений. https://runebook.dev/ru/docs/python/library/hashlib

ВЕРОЯТНОСТЬ НАСЛЕДОВАНИЯ НЕСВЯЗАННЫХ ГЕНОВ В 5-М ПОКОЛЕНИИ

Полванов Р.Р., Шарипов Ф.М. (НамГУ)

Аннотация: *Работа посвящена расчетам вероятностей для 4 пар несвязанных генов в 5-м поколении.*

Ключевые слова: *доминантный, рецессивный, несвязанный, гаметы, хромосомы, скрещивания, панмиксия.*

THE PROBABILITY OF INHERITANCE OF NON-LINKED GENES IN THE 5TH GENERATIONS

R.R. Polvanov, F. M. Sharipov (NamSU)

Abstract: *The work is devoted to the probability calculations for 4 pairs of uncoupled genes in the 5th generation*

Key words: *Dominant, recessive, uncoupled, gametes, chromosomes, crosses, panmixia.*

As you know, the phenomenon of suppression of one characteristic by others is natural. *A* sign that suppresses another is called dominant, and the next is recessive. Dominant denote by the capital letter *A*. Recessive sign small letter *a*. Each gene has two varieties - dominant and recessive trait. Therefore, genes go in pairs.

In each pair of homologous chromosomes, one chromosome is derived from the father and the other from the mother.

Different States of the gene called alleles. When crossing the separation of allele pairs where one gene leaves one gamete the other in the other gamete, so that they again will be two.

Consider Gg, Hh, Aa, Bb four uncoupled genes. Each of the parents, as well as their descendants, will be designated by the letters $M-$ mother, $F-$ father, $C-$ their descendants.

Using T_i we denote the $i-$ th type.

When each new individual of the same species appears, it has one of four combinations of these genes.

Assume that genes not related to sex and when crossing out of 81 genotypes:

$T_1 = Gghhaabb$, $T_2 = GGhhaabb$, $T_3 = ggHhaabb$, $T_4 = GgHhaabb$,
$T_5 = GGHhaabb$, $T_6 = ggHHaabb$, $T_7 = GgHHaabb$, $T_8 = GGHHaabb$,
$T_9 = gghhAabb$, $T_{10} = GghhAabb$, $T_{11} = GGhhAabb$, $T_{12} = ggHhAabb$,
$T_{13} = GgHhAabb$, $T_{14} = GGHhAabb$, $T_{15} = ggHHAabb$, $T_{16} = GgHHAabb$,
$T_{17} = GGHHAabb$, $T_{18} = gghhAAbb$, $T_{19} = GghhAAbb$, $T_{20} = GGhhAAbb$,
$T_{21} = ggHhAAbb$, $T_{22} = GgHhAAbb$, $T_{23} = GGHhAAbb$, $T_{24} = ggHHAAbb$,
$T_{25} = GgHHAAbb$, $T_{26} = GGHHAAbb$, $T_{27} = gghhaaBb$, $T_{28} = GghhaaBb$,
$T_{29} = GGhhaaBb$, $T_{30} = ggHhaaBb$, $T_{31} = GgHhaaBb$, $T_{32} = GGHhaaBb$,
$T_{33} = ggHHaaBb$, $T_{34} = GgHHaaBb$, $T_{35} = GGHHaaBb$, $T_{36} = gghhAaBb$,
$T_{37} = GghhAaBb$, $T_{38} = GGhhAaBb$, $T_{39} = ggHhAaBb$, $T_{40} = GgHhAaBb$,
$T_{41} = GGHhAaBb$, $T_{42} = ggHHAaBb$, $T_{43} = GgHHAaBb$, $T_{44} = GGHHAaBb$,
$T_{45} = gghhAABb$, $T_{46} = GghhAABb$, $T_{47} = GGhhAABb$, $T_{48} = ggHhAABb$,
$T_{49} = GgHhAABb$, $T_{50} = GGHhAABb$, $T_{51} = ggHHAABb$, $T_{52} = GgHHAABb$,
$T_{53} = GGHHAABb$, $T_{54} = gghhaaBB$, $T_{55} = GghhaaBB$, $T_{56} = GGhhaaBB$,
$T_{57} = ggHhaaBB$, $T_{58} = GgHhaaBB$, $T_{59} = GGHhaaBB$, $T_{60} = ggHHaaBB$,
$T_{61} = GgHHaaBB$, $T_{62} = GGHHaaBB$, $T_{63} = gghhAaBB$, $T_{64} = GghhAaBB$,
$T_{65} = GGhhAaBB$, $T_{66} = ggHhAaBB$, $T_{67} = GgHhAaBB$, $T_{68} = GGHhAaBB$,
$T_{69} = ggHHAaBB$, $T_{70} = GgHHAaBB$, $T_{71} = GGHHAaBB$, $T_{72} = gghhAABB$,
$T_{73} = GghhAABB$, $T_{74} = GGhhAABB$, $T_{75} = ggHhAABB$, $T_{76} = GgHhAABB$,
$T_{77} = GGHhAABB$, $T_{78} = ggHHAABB$, $T_{79} = GgHHAABB$, $T_{80} = GGHHAABB$,
$T_{81} = gghhaabb$

Fertilization is random and the genetic composition of the gametes chosen from F does not depend on the genetic composition of the gametes chosen from M, and in all groups of crossing is panmixia.

Our task is to determine the probability of possession of the property $T_i, i = 1,81$ of the descendant of C.

Let p_i and k mean the probabilities that M and F, respectively, will have a genetic type

$$T_i, i = \overline{1,81}, \quad \sum_{i=1}^{81} p_i = 1, \quad \sum_{i=1}^{81} q_i = 1,$$

while X and Y correspondingly carry one of the sixteen genes:
$ghb, ghb, ghb, ghb, Ghb, Ghb, Ghb, ghb, hab, hab, HAB, Ghb, Ghb, Ghb, GHB, GHB$.

Since genes are not related to sex, the distribution of genetic types in the $n-$ th generation is the same as in the $n-1$ generation.

The problem consists of calculating the probabilities of inheritance of the property T_i in the $n-$th generation, in $p(n,i)$ we denote the probability that an individual With in the $n-$ th generation has the property T_i.

Let $p(0,i) = p_i, q(0,i) = q_i$.

$$p(1,1) = \tfrac{1}{2}p_1q_1 + \tfrac{1}{2}p_1q_2 - \tfrac{1}{4}p_1q_3 + \tfrac{1}{4}p_1q_4 + \tfrac{1}{4}p_1q_5 + \tfrac{1}{4}p_1q_9 + \tfrac{1}{4}p_1q_{10} + \tfrac{1}{4}p_1q_{11} + \tfrac{1}{8}p_1q_{12} + \\ + \tfrac{1}{8}p_{81}q_{31} + \tfrac{1}{4}p_{81}q_{32} + \tfrac{1}{8}p_{81}q_{37} + \tfrac{1}{4}p_{81}q_{38} + \tfrac{1}{16}p_{81}q_{40} + \tfrac{1}{8}p_{81}q_{41}$$

We compute some $p(n,i)$:

To calculate $p(n,i)$, $n \geq 2$ we use the method used in the calculation $p(1,i), i=1,81$.

$$(3,1) = \frac{1}{2}p(2,1)q(2,1) + \frac{1}{2}p(2,1)q(2,2) + \frac{1}{4}p(2,1)q(2,3) + \frac{1}{4}p(2,1)q(2,4) + \frac{1}{4}p(2,1)q(2,5) + \frac{1}{4}p(2,1)q(2,9) + \frac{1}{4}p(2,1)q(2,10) + \frac{1}{4}p(2,1)q(2,11) - \frac{1}{8}p(2,1)q(2,12) + + \frac{1}{8}p(2,81)q(2,31) + \frac{1}{4}p(2,81)q(2,32) + \frac{1}{8}p(2,81)q(2,37) + \frac{1}{4}p(2,81)q(2,38) + \frac{1}{16}p(2,81)q(2,40) + \frac{1}{8}p(2,81)q(2,42)$$

If known p_i, q_i calculate $p(n,i)$. I will use the program Delphi.

If $p_i = q_i$.

By asking p_i we compute $p(n,i)$.

Conclusion. Examples show that when genes are not linked the probability of distribution of genetic types when four gene pairs are different.

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УДК 519.21

ИММИГРАЦИЯЛИ БЕЛЛМАН-ХАРРИС ТАРМОҚЛАНИШ ЖАРАЁНИНИ ЯШАШ ДАВРИ

Машраббоев Ахмадали

НамДУ математик анализ кафедраси доценти,

Умматалиев Умиджон Икромжон уғли

НамДУ 2-курс магистранти,

Ибрагимова Нигора Абдуғофуровна

НамДУ 1-курс магистранти

E-mail: ahmadali51@mail.ru Тел:+998913584177

Аннотация: *Иммиграцияли Беллман-Харрис жараёни учун битта лимит теорема исботланган, бу теоремада асосий жараён узлуксиз бўлиб, иммиграция дискрет тақсимотдан иборат, яъни иммиграция бутун қийматларни қабул қилувчи жараёндан иборат.*

Калит сўзлар: *жараён, иммиграция, момент, тасодифий миқдор.*

UDC 519.21

LIVING PERIODS OF THE BELLMAN-HARRISS BRANCHING PROCESS WITH IMMIGRATION

Mashrabboev Ahmadali

associate professor of the department of mathematical analysis of NamSU Ummataliev Umidjon Ikromjon ugli

2nd year master's student of NamSU

Ibragimova Nigora Abdugofurovna

МУНДАРИЖА

ФИЗИКА-МАТЕМАТИКА ФАНЛАРИ

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