Design and Empirical Exploration for Second Trimester Period using Markov Process

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Abstract: This research investigates the conditioned level in the mid-gestation period using stochastic model such as Markov process which requires the Monte Carlo simulation to get the intended results. The simulation in fetal stages addresses the influence of possible risk factor in different levels. The abnormal conditioned in mid-pregnancy that affects the behavioral randomness of the fetal development. The equation of the data implement through the Monte Carlo equation. Empirical Analysis has showed in the behavioral changes of fetal development during mid-gestation.

Keyword: Gestation, mathematical model, Pregnancy, Stochastic processes.

I. INTRODUCTION

Gestational age is a measure of the age of a pregnancy which is taken from the woman's last menstrual period (LMP), or the corresponding age of the gestation as estimated by a more accurate method if available. Fetal development period from the time of conception until birth. For humans, the full gestation period is normally 9 months. Conception to about the 12th week of pregnancy marks the first trimester. The second trimester is weeks 13 to 27, and the third trimester starts about 28 weeks and lasts until birth.

Mathematical Model formulation:

II. MATHEMATICAL MODEL FORMULATION

For sufficiently large number of data this model is valid. The stochastic process generalize the simple deterministic model in several ways towards making them more realistic. The initial simple deterministic model is generalized in the other way to study stochastic model. The stochastic version is derived for quasi-stationary distributions and time extinct is approximated. It is differentiated as Susceptible, Infected and Recovered. It is valid for sufficiently large size in population which is approximated. The goal of the study of this model is to find the distribution and time which is approximated.

A. Notations:

n- Population size  
α- The non-infected rate  
β- Infected per individuals  
β_1- The additional infected rate  
In additional the θ is denoted recovered rate for infected individuals.

B. Model formulation:

The Susceptible (u), infected (f) and recovered(c) takes the form of Bivariate Markova population processes. The state probabilities can be given as

P_{ufc} = P(U(t) = u, F(t) = f, C(t) = c)

Then probabilities can be written as

Where

h(u, c) = \lambda_1(u, f, c) + \beta_1(u, f, c) + \beta_2(u, f, c) + v_2(u, f, c) + v_3(u, f, c)
The announcing interim of irresistible maladies is resolved as a period unit paying little heed to the attributes of the illness. No rules have been proposed to pick the announcing interim of irresistible illnesses. A remedied articulation for this amount and proposes straightforward calculations to gauge the successful proliferation number as an element of time, changing the detailing interim to the age time of an illness and showing an unmistakable relationship among the age time appropriation, announcing interim and development pace of a pestilence. The view that the measurable strategy to decide the announcing interim is thickness estimation, which may recommend a stochastic model for this venture. In spite of the fact that the most exact revealing interim (for example revealing in a nonstop time scale) would unquestionably yield the best understanding of the transmission elements, it is regularly unreasonable to get information and investigate on an hourly or consistent schedule. To succeed, annihilation will require a key arrangement that is continually refreshed with the observation, checking, and assessment information. Also, arranging forms include a type of applied model, and this model will essentially think about numerous potential wellsprings of vulnerability. Reasonable quantitative scientific models give that most ideal approach to combine data, measure vulnerability, and extrapolate current information. Such models can give basic quantitative bits of knowledge that are not generally conceivable.

C. Methodology:

After collecting the data of susceptible, infected and recovered the probabilities can be continued in the continuous time state space. The Markov chain is continues but the state variable is discrete.

\[ U(t), F(t), C(t) \in \{0,1,2,3, \ldots \ldots \ n\} \]

Here it is based on the clustering of random variables and their probability functions

\[ P(t) = \left( P_1(t), \ldots, P_n(t) \right)^T \]

The Monte Carlo simulation add-in of the Microsoft office Excel package was used to carry out the disease by generating simple paths and the probability distribution associated with UFC models.

D. Data:

The data has been used form the medical records of the patients who are pregnant women and undergone treatment for IVF of the age between 21-35 years between 7-9 months that is mid-pregnancy stage (second trimester).

E. Results:

Running the reproduction on Monte Carlo include in bundle Microsoft Excel with 10 redundancies, that is, 10 example spaces into the future before the first information gotten from the therapeutic record of the General Hospital between the age 21-35; the outcomes are introduced on Figure 1 and Tables 1 appeared underneath with its individual outline measurements for ladies who has tainted and has high hazard in the phase of trimester.

Table 1:

<table>
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</table>

Table 1 represent the patients affected, additional affected and recovered in the months between 7-9 months and at the age of 21-35.

Figure 1:

Figure 1 represent the patients affected and has high risk percentage in between the 7-9 months of the age between 21-35. The figure shows that the patients of 7.5-8 months has more percentage getting risk of abortion and getting affected. So the care and diagnosis should give during this months.

III. CONCLUSION

The conditioned level in the mid-gestation period using stochastic model such as Markov process which requires the Monte Carlo simulation was deliberated. The simulation in fetal stages addresses the influence of possible risk factor in different levels. The abnormal conditioned in mid-pregnancy that affects the behavioral randomness of the fetal development. The equation of the data implement through the Monte Carlo equation. Empirical Analysis has showed in the behavioral changes of fetal development during mid-gestation. By analyzing the tabulated values and graph it is shown that the patients of 7.5-8 months get more affected and infected and the diagnosis and care should be given at this duration of months.
REFERENCES


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