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An Analysis of buffering Time in Cabel TV services by Tandem Queuing Model

Abstract

In this paper we consider a framework with a dynamic group of onlookers inspired by a typical communicate from a focal server. This can be demonstrated as a lining framework in ceaseless time with clients (the group of onlookers) touching base as per a Poisson procedure of force λ. The server can benefit the gathering of people with communicates isolated by an exponentially dispersed arbitrary length, whose greatest rate is μ (and can be controlled to any an incentive in the vicinity of θ and μ). At whatever point a communicate is made, the whole group of onlookers present in the framework at that occurrence is served (i.e., the aggregate number of clients is lessened to θ at that occasion). There are non-negative expenses related with each communicate, and furthermore to hold clients in the framework, which is determined by a cost rate work that relies on upon the quantity of clients in the framework at any given time. This cost rate capacity could be for example, straight, or all the more for the most part even raised in the quantity of clients holding up. Our point is to limit the endless skyline reduced cost, and to comprehend the structure of the related ideal approaches.

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Introduction

The general communicate booking issue emerges in applications where a focal server has different pages with client demands for each page arriving freely. Each administration can fulfill every extraordinary demand for any single page. he point is for the most part to limit either the normal sitting tight time for the page asks for, or to limit the greatest holding up time. An expansive collection of work in the database and calculations writing has concentrated on booking for the telecom demonstrate (eg: [5], [4], [7], [4], [6], [1]). A solid accentuation is on aggressive examination, in which neglectful online arrangements and ideal disconnected calculations that have an exact learning without bounds test way of the client entries are broke down. To put the stochastic control show in context with this substitute line of examination, one could see this as a center ground between the omniscient disconnected calculation and the totally unaware online calculation, since the supposition of Poisson entries adds up to a fractional information on the example ways of client landings. In this specific circumstance,[3] concentrates the clump preparing issue in various lines. A variation with steady administration time was considered additionally in [2].

Review Of General Environment In The Broadcasting Services

Television and Radio Services is always consider under the broadcasting sector. After China ,India treat as the second largest TV market in world . The same as industry estimates, as on March 2015, of the 277[1] million households, around 175[1] million have been projected to have Television sets catered to by cable TV systems, DTH services, IPTV services and the terrestrial TV network of Doordarshan, put together. 76.05 million subscribers (41.152 million active subscribers) have registered on DTH and around half a million subscribers on IPTV . Cable TV is expected to have around 101[1] million subscribers. The global TV network of Doordarshan covers about 92[2] % of population of the country through a huge network of Telecom Regulatory Authority of India [TRAI][9].

The broadcasting and cable television services sector consists of 53 pay broadcasters, an estimated 60,000 cable operators, 6000 Multi System Operators (MSOs) (including 155 MSOs registered in DAS), six pay DTH operators, apart from a public service broadcaster Doordarshan, having free-to-air DTH service. There were 8292 TV channels registered with the Ministry of Information and Broadcasting at the end of financial year 2014-15 out of which 205 were SD pay TV channels and 42 HD Pay TV channels and 4 advertisement –free pay channels. India's TV industry grew from Rs.417003 Crore in the year 2013-14 to Rs.475003 Crore in the year 2014-15, thereby registering a growth of around 14%. The subscription revenue accounts for the major share of the overall revenue of the TV industry. The subscription revenue grew from Rs.281003 Crore in the year 2013-14 to Rs. 320003 Crore in the year 2014-15. The advertisement revenue in the TV sector in India grew up from Rs. 136003 Crore in the year 2013-14 to Rs.155003 Crore in the year 2014-15. The FM (Frequency Modulation) radio sector has also shown an impressive growth. There were 243 private FM radio stations operational by March 2015, besides the public service broadcaster- All India Radio (AIR) having a network of 414 stations and 596 broadcast transmitters [145 are MW (Medium Wave), 403 FM and 48 SW (Short Wave)] .The coverage of AIR service is around 99.20%4 of the geographical area of the country, serving 99.18%4 of the population. There is a large growth in the radio industry and advertisement in the main revenue quantity tool .In 2014-2015 advertisement grow with 16% rate generating during the year 2014-2015.Core industry which will increase upto 1633 crore in 2014-15.Government has issued 208 licenses for community radio till march 2015 out of while 180 were operational. In last decade the DTH have revolutionaries digital TV market. the rate of growth of DTH subscribes are 3.3 lakh per month. This shown the acceptance and popularity of DTH in Indian society.

Concept and Hypothesis

The count of Tv households has been increased to 175 million in year of 2015. Consequently cable TV sector has become a large pay television sector with approximate subscribers base of about 101 million subscribers. The same conclusion can be drown from figure 1.Here we analysis the data and try to reduce the buffering time of Cable TV .

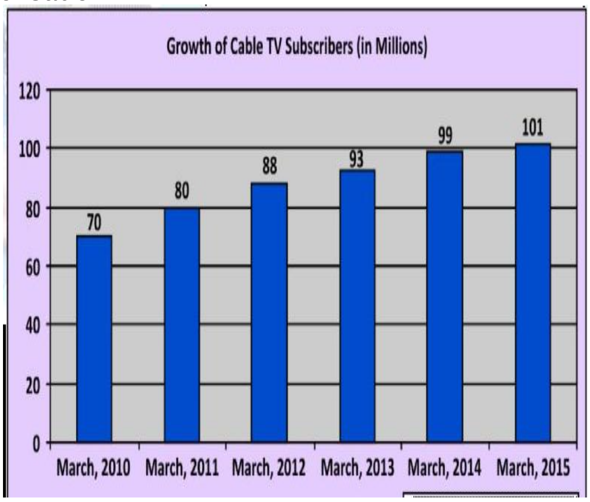

Fig 1: Yearly figure & growth of Cable TV Subscribers

Scheduling Of Multiple Tandem Queues

In this section we shall consider the case of two queues. Unlike the single queue case for which we were able to tackle the convex cost model (and the monotone cost model was handled), we will only consider a monotone cost in the number of waiting customers for two queues. More explicitly, there are two classes of customers who arrive according to independent Poisson processes of rates $\lambda_1$and λ_2 [8]. We also have a broadcasting server of rate μ .Assume without loss of generality that $\lambda_1 + \lambda_2 + \mu = 1$. The is no service cost. Let the cost rate be given as c(x_1; x_2) when the number of customers in queues 1 and 2 is x_1; x_2 respectively. We shall assume that c is non decreasing in (x_1; x_2). Again, although a continuous time system, the time integrals of the instantaneous cost (both discounted as well as long run average) can be conveniently cast in terms of the discrete time jump processes because of the independence of inter-event times with respect to the states (which comes from the Poisson arrivals and service processes). Let βbe the equivalent discount factor for this discrete time problem. Let c_1 and c_2 be the equivalent service costs for queue 1 and 2 respectively for the equivalent discrete time problem. The n step cost function starting at state ($x_1(0)$; $x_2(0)$) is (where u notes control and the evolution of the state is implicitly as per control u):

$$V_n(x_1,x_2)= \inf_u E^u_{(x1(0),x2(0))} \sum_{k=0}^{n-1} \beta^k c(x_1(k), x_2(k))$$

Via dynamic programming, we can recursively characterize V_n

As : V_0=0,

And

$$V_{n+1}(x_1,x_2) = C(x_1,x_2) + \beta\{\lambda_1 V_n(x_1+1,x_2) + \lambda_2 V_n(x_1,x_2+1) + \mu \min(V_n(x_1,0),(V_n(0,x_2)))\} \tag{1}$$

The optimal control action with n steps to go at state (x_1; x_2) is given by:

$$u_n(x_1,x_2) = \begin{cases} 2, & if \quad .V_n(x_1,0) \le V_n(0,x_2) \\ 1, & otherwise \end{cases} \tag{2}$$

In the above description, the control variable $u_n(x_1,x_2)$ denotes the queue to be served at state (x_1,x_2) Remark 1: By letting $n \to \infty$ it can be argued that V_∞ exists and V_n converges to it, and V_{n+1} also inherits the properties of V_n that are shown below via induction, including the switching structure, because the set of functions satisfying them is closed under point-wise limits.

Let

$$(x_1, x_2) \prec (y_1, y_2) \Leftrightarrow x_1 \le x_2 \quad and \quad y_1 \le y_2$$

Theorem 1:
For any

$$x \in Z_+^2, y \in Z_+^2 \quad suchthat \quad x \prec y, V_n(x) \le V_n(y)$$

Proof: Let $x = (x_1, x_2), y = (y_1, y_2)$ be such that $x \prec y$ .The assertion holds for n=0 from the monotonicity of c. We also have:

$$V_{n+1}(y) - V_{n+1}(x) = c \quad (y_1, y_2) - c \quad (x_1, x_2) + \beta\lambda_1(V_n(y_1+1, y_2) - V_n(x_1+1, x_2))$$
$$+ \beta\lambda_2(V_n(y_1, y_2+1) - V_n(x_1, x_2+1))$$
$$+ \beta\mu(\min(V_1(y_1,0), V_n(0, y_2) - \min(V_1(x_1,0), V_n(0, x_2))$$

If $x \prec y$,we also have $(x_1+1, x_2) \prec (y_1+1, y_2), (x_1,0) \prec (y_1,0), etc.$

If the assertion holds for n, one can easily check that this implies that each of the above terms is non-negative. Therefore, it also holds for n + 1.

Theorem 2: The optimal control with n steps to go is given by a switch curve:

$$u_n(x_1, x_2)\begin{cases} 2 & ,if \quad x_2 \ge s_n(x_1) \\ 1 & ,otherwise \end{cases} \tag{3}$$

Where

$$S_n(x) = \min\{y : V_n(x,0) \le V_n(0, y)\} \tag{4}$$

Proof

Follows from interpreting equation (2) using theorem 1.

Finding

This analysis aims at:

1. The quantification of the delay associated with three-station or double-station queuing network systems,
2. The quantification of the delay associated with multiple queuing tandems, and
3. The comparison of (1) & (2) in order to quantify the level to which multiple queuing tandems have eradicated the problem of delay which had been a problem for the service providers and hence, for the customers.

The existence of multiple relay nodes in the multiple queuing tandems helps in increasing the load balancing factor, which is comparatively low in the two or three-station queuing models.

Conclusion

The broadcast service tandem queuing model which corresponds to batch processing with a batch size infinity was considered. This increase in the subscriber base in all these years has been aptly addressed because of the Multiple queuing tandem. The overwhelming response of the subscribers has been only because of the matching service base. With a number of broadcasting companies like Tata Sky, Airtel, DishTV, Videocon D2H, etc, the competition has been cut throat. With a number of options that are available to the customers in terms of monetary plans, in terms of quality, and in terms of quantity, the awareness levels have been rising every year. Consequently, the desirability for the broadcasting companies to provide better and cheaper plans has been increasing simultaneously. To answer all these demands in the best possible manner is the first and foremost success formula for all of these companies. The need of the hour is to increase the subscriber base without compromising with the present subscriber base. For this, multiple queuing tandems have been posing as the suited saviors. For instance, had multiple queuing tandems not been there, this increasing demand would have been left un-supplied for.

Multiple queuing tandems help create various entries and escapes for serving all these increasing demands simultaneously, unlike the three-station and two-station queuing systems that make the increasing demands wait unless a service is free to be rendered owing to the scarce number of services available.

The delay associated with the earlier systems of queuing that acts as a limitation for them has been addressed by multiple queuing tandems by lessening it for the opportunistic networks.

Suggestion

There are some suggestion also connected this analysis

1. In present time we see that the TRAI is bounded the TV channel for the setup box and other digital TV channel .
2. Here we only apply our model and calculate the result for broadcasting service in Digital TV channel like Dish TV , D2H ,Cable TV etc .
3. This same system can also be calculated for SETUP BOX to reduce the buffering of broadcasting.

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