

# 観光客の属性と観光行動の関係

Relationship between tourist attributes and tourist behavior

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- 観光客は時間制約や自身の興味、他人のレビューなど、様々な要因を考慮する。  
Tourists consider a variety of factors, including time constraints, their own interests, and the reviews of others.
- こうした行動を意向調査や来訪者の属性調査の結果から単純に推測することは難しい。  
It is difficult to simply infer such behavior from the results of intention surveys or visitor demographics surveys.
- 我々は観光行動調査結果から、制約時間の中で複数の観光地への時間配分を行う行動モデルを構築し、観光客や観光地点の属性と観光行動の関係を調べた。  
Based on the results of our survey of tourist behavior, we constructed a behavioral model that allocates time to multiple tourist destinations within a constrained time frame, and examined the relationship between the attributes of tourists and tourist sites and tourist behavior.

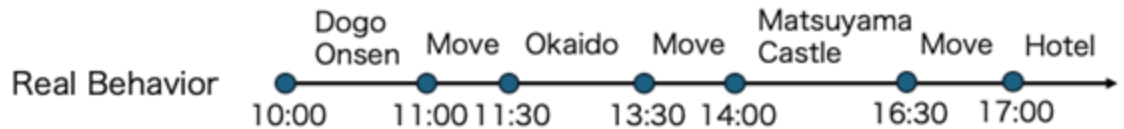


## 道後PP / Dougo PP (2017)

- 道後温泉の旅館・ホテルの宿泊客の観光行動データ（GPS・記述回答）  
Composed by the behavior of tourists who stayed at Dogo Onsen (GPS, descriptive answers)
- このうち、GPSデータはチェックイン～チェックアウト間のみなど不完全であった  
GPS data is often incomplete, e.g., only between check-in and check-out
- そこで、松山市内の以下の観光エリアに限定し、記述回答から滞在時間データを構成した  
Therefore, we aggregated descriptive response data on sightseeing time in several sightseeing areas in Matsuyama City.

## 対象としたエリア / Areas we focused on

1. 道後温泉 / Dogo Onsen
2. 道後公園 / Dogo park
3. 松山城 / Matsuyama castle
4. 大街道 / Okaido
5. 松山市駅 / Matsuyama-shi station
6. 松山駅 / Matsuyama station

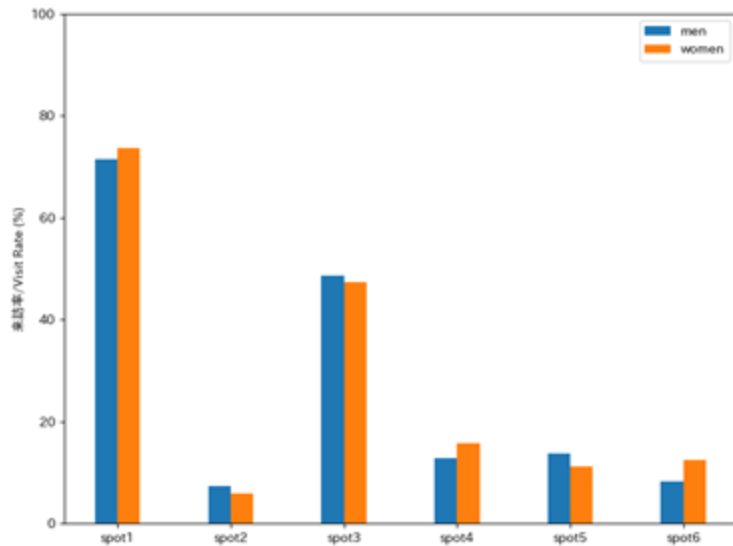


Estimated Data

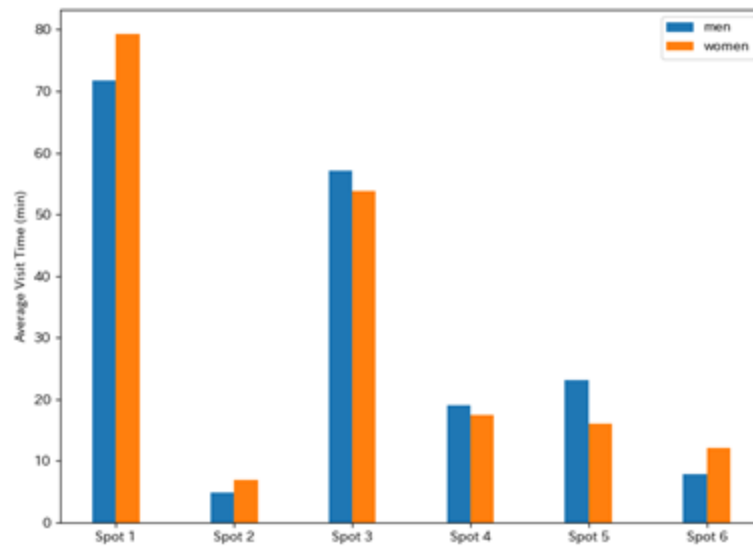
spot1	spot2	spot3	spot4	spot5	spot6
60	0	150	120	0	0



来訪率 / Visit Rate [%]



平均滞在時間 / Average Stay Time [min]

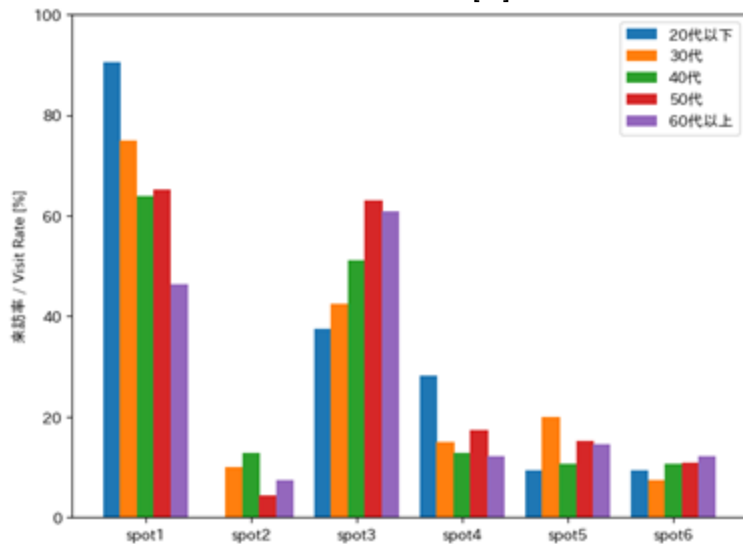


各性別の回答者の各spotの来訪率・平均滞在時間  
Visit rate and average stay time for each gender

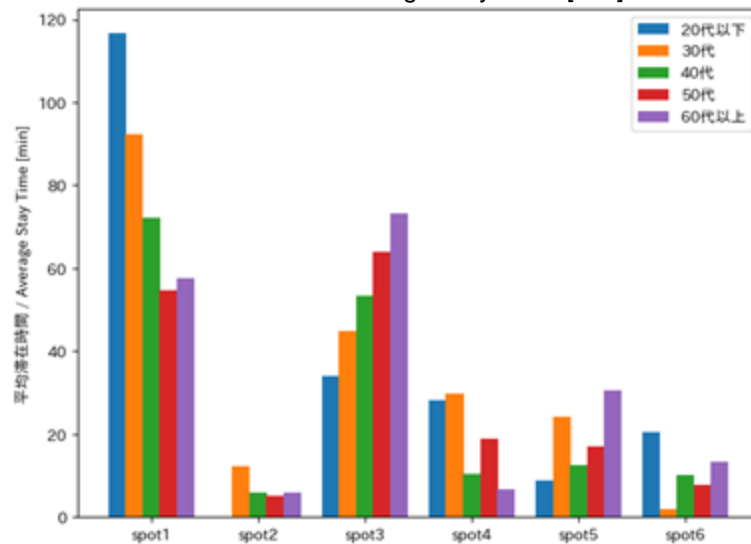
- 道後温泉(Spot1)について女性の方が平均滞在時間が長いのは入浴時間が長いため？  
The reason that women tend to stay longer in Dogo onsen (spot1) can be guessed as women tend to spend longer time in bath.



来訪率 / Visit Rate [%]



平均滞在時間 / Average Stay Time [min]



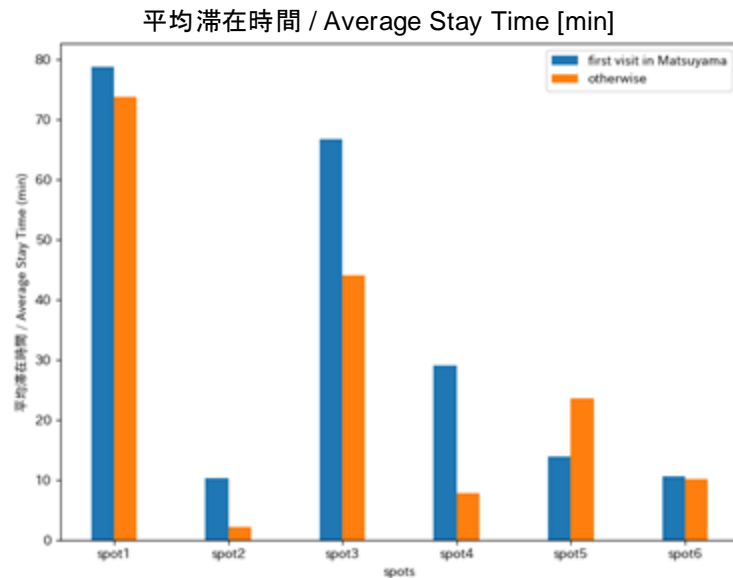
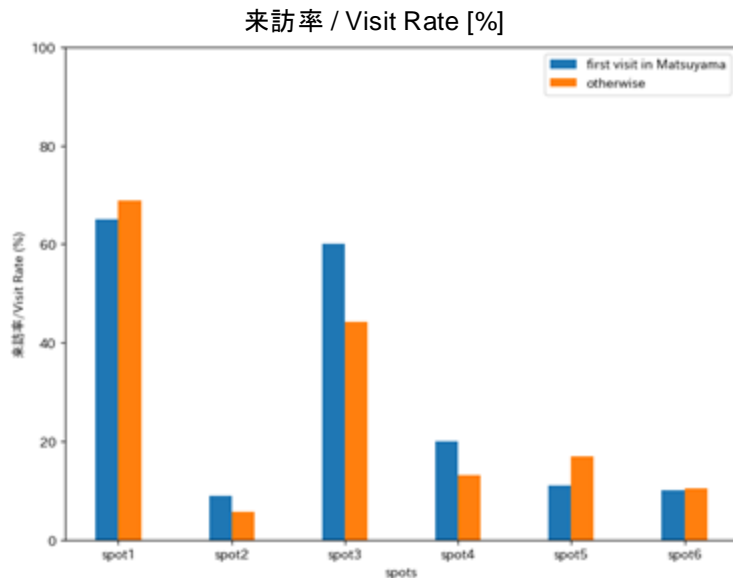
回答者の年代別での各spotの来訪率と平均滞在時間  
Visit rate and average stay time of each spot for each age range

- 道後温泉 (spot1)は高齢者ほど来訪・滞在しづらく, 松山城 (spot3)は高齢者ほど来訪・滞在しやすい

Elderly people are less likely to visit and stay at Dogo Onsen (spot 1), while they are more likely to visit and stay at Matsuyama Castle (spot 3).



# Basic Analysis - visit experience

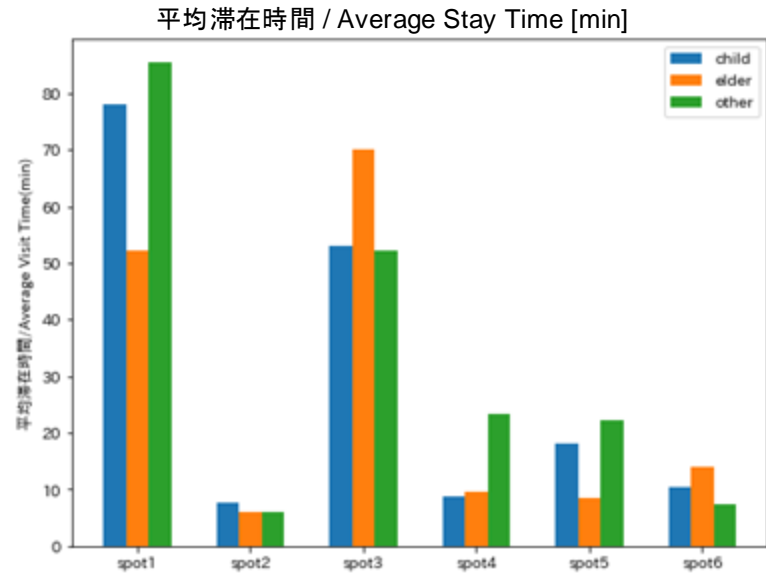
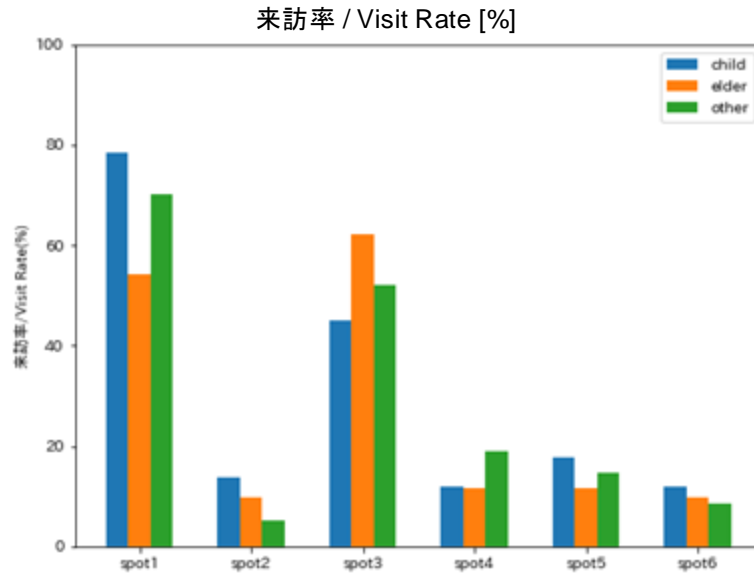


回答者の来訪回数別（初回・2回目以上）での各spotの来訪率と平均滞在時間  
visit rate and average stay time of respondents' visit experience (first time / more than twice)

- 初めて松山を訪れる人は松山城や大街道に行きやすく滞在時間も長い  
First-time visitors to Matsuyama are more likely to visit Matsuyama Castle and Okaido, and they tend to spend more time there.



# Basic Analysis - companion's characteristic



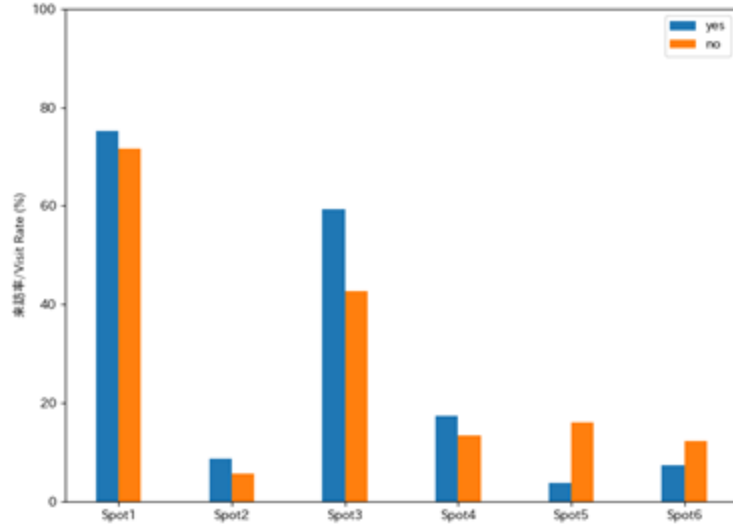
同行者属性（小学生以下の子ども・60歳以上の高齢者・その他）での各spotの来訪率と平均滞在時間  
visit rate and average stay time of respondents' companion (child under 12 / elder people over 60 years old / other)

- 65歳以上の同行者がいる人は松山城に訪れやすく、滞在時間も長い  
People with elderly person tend to visit Matsuyama castle more and for long time.

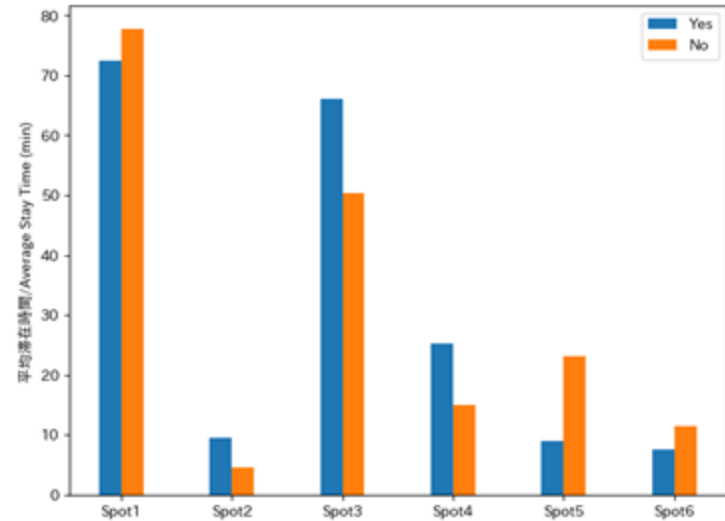


# Basic Analysis - interest in history

来訪率 / Visit Rate [%]



平均滞在時間 / Average Stay Time [min]



歴史への興味の有無と各spotの来訪率と平均滞在時間

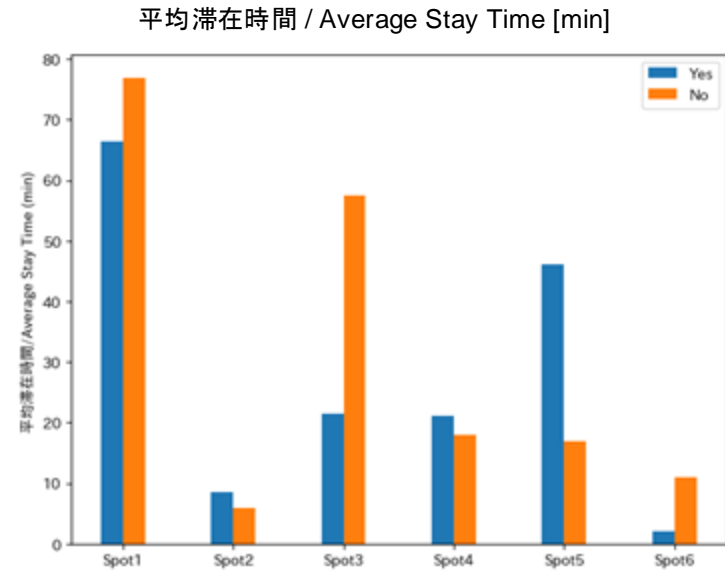
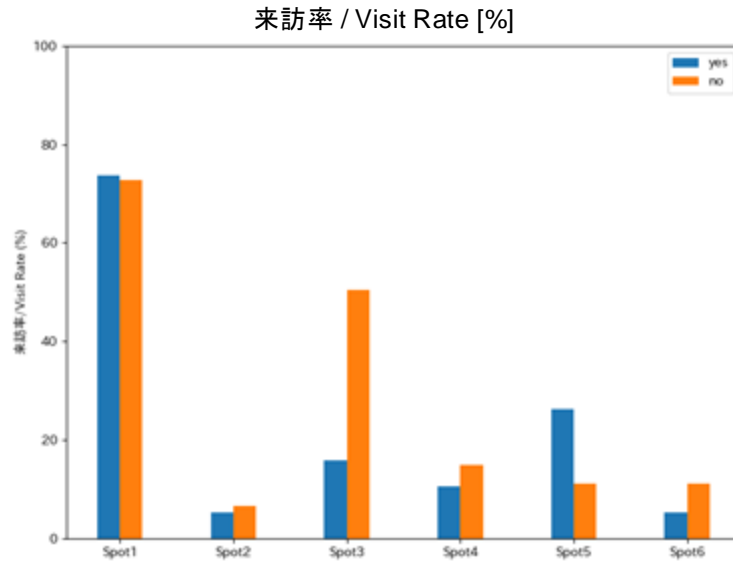
Relationship between interest in history and average time spent in each spot / visit rate of each Spot

- 歴史に興味ある人の方が、より松山城を訪れ、より滞在する傾向がある。  
People interested in history are more likely to visit and stay at Matsuyama Castle.





# Basic Analysis - new onsen facility



新温泉施設の興味の有無と各spotの来訪率と平均滞在時間

Relationship between interest in new onsen facilities and average time spent in each spot / visit rate of each Spot

- 新温泉施設の開業への興味がある人はより松山城を訪れず、松山市駅を訪れる。  
Those interested in the opening of new spa facilities visit Matsuyama Castle rather than Matsuyama Station .



- 観光目的地とその滞在時間の同時選択を表現  
Represent the simultaneous choice of destinations and the duration of stay
- K個の目的地の中からM個を選び、それぞれに $x_1$ から $x_M$ の時間を配分する場合の選択確率  
Choice probability when selecting M destinations from K alternatives and allocating times  $x_1$  to  $x_M$  for each of them

$$P(x_1^*, x_2^*, \dots, x_M^*, 0, 0, \dots, 0) = \left[ \prod_{i=1}^M \left( \frac{1 - \alpha_i}{x_i^* + \gamma_i} \right) \right] \left[ \sum_{i=1}^M \left( \frac{x_i^* + \gamma_i}{1 - \alpha_i} \right) \right] \left[ \frac{\prod_{i=1}^M e^{V_i}}{(\sum_{k=1}^K e^{V_k})^M} \right] (M - 1)!$$

ただし推定の際はパラメータ $\alpha_i=0$ ,  $\gamma_i=1$ に固定

Parameters are fixed at  $\alpha_i=0$  and  $\gamma_i=1$  for all  $i$  when estimating

- 個人属性と選択の関係性を分析  
Using this model, we analyze the relationship between individual characteristics and choices



$$V_1 = ASC_1 + \beta_{point} \cdot x_{1\ point} + \beta_{1\ women} \cdot x_{women\ dummy} + \beta_{1\ elder} \cdot x_{60\ dummy}$$

$$V_2 = ASC_2 + \beta_{point} \cdot x_{2\ point}$$

$$V_3 = ASC_3 + \beta_{point} \cdot x_{3\ point} + \beta_{3\ elder} \cdot x_{60\ dummy} + \beta_{3\ first\ time} \cdot x_{first\ time\ dummy} \\ + \beta_{3\ histry} \cdot x_{histry\ dummy} + \beta_{3\ new\ onsen} \cdot x_{new\ onsen\ dummy}$$

$$V_4 = ASC_4 + \beta_{point} \cdot x_{4\ point} + \beta_{4\ first\ time} \cdot x_{first\ time\ dummy}$$

$$V_5 = ASC_5 + \beta_{point} \cdot x_{5\ point} + \beta_{5\ histry} \cdot x_{histry\ dummy} + \beta_{5\ new\ onsen} \cdot x_{new\ onsen\ dummy}$$

$$V_6 = \beta_{point} \cdot x_{6\ point}$$

parameter		parameter	
$ASC_i$	各選択肢の定数項	$\beta_{4\ first\ time}$	大街道の松山初訪問ダミー
$\beta_{point}$	評価点数	$\beta_{3\ histry}$	松山城の歴史興味ありダミー
$\beta_{1\ women}$	道後温泉の女性ダミー	$\beta_{5\ histry}$	松山市駅の歴史興味ありダミー
$\beta_{1\ elder}$	道後温泉の60代以上ダミー	$\beta_{3\ new\ onsen}$	松山城の新しい温泉施設興味ありダミー
$\beta_{3\ elder}$	松山城の60代以上ダミー	$\beta_{5\ new\ onsen}$	松山市駅の新しい温泉施設興味ありダミー
$\beta_{3\ first\ time}$	松山城の松山初訪問ダミー	$\beta_{3\ with\ elder}$	松山城の高齢者同行ダミー



変数	パラメータ	t値
ASC1	4.751	37.41
ASC2	-1.311	-7.82
ASC3	0.303	2.78
ASC4	-0.341	1.19
ASC5	-0.351	-1.29
$\beta_{\text{point}}$	2.767	19.41
$\beta_1$ women	0.368	1.27
$\beta_1$ elder	-2.214	-3.71
$\beta_3$ elder	-0.288	-0.53
$\beta_3$ first	-0.081	-0.23
$\beta_4$ first	-0.971	-2.17
$\beta_3$ history	1.170	3.06
$\beta_5$ history	-0.150	-0.29
$\beta_3$ new onsen	0.854	1.03
$\beta_5$ new onsen	-0.029	-0.03
$\beta_3$ with elder	-0.348	-0.80
初期尤度	-2626.527	
最終尤度	-2008.164	
尤度比	0.235	

- 次のパラメータは符号が基礎分析での傾向と一致した

The following parameters have signs consistent with the trend in the basic analysis matched the trend in the basic analysis.

**1 women, 1 elder, 3 history, 5 history**

- 次のパラメータは符号が基礎分析での傾向と一致しなかった

The following parameters have signs consistent with the trend in the basic analysis matched the trend in the basic analysis.

**3 elder, 3 first, 4 first, 3 new onsen, 5 new onsen, 3 with elder**



- 観光地選択, 滞在時間配分を行うMDCEVモデルを構築することで, 個人属性による観光行動への影響を理解可能な分析が行えた

By constructing an MDCEV model of tourist destination choice and time allocation, we were able to analyze the effects of individual attributes on tourist behavior.

- 基礎分析の傾向と推定パラメータの符号が一致しなかったのは使用した変数間に相関があるためだと考えられる

The lack of agreement between the trends in the basic analysis and the signs of the estimated parameters can be attributed to correlations between the variables used.

- 観光客の興味が社会的なトレンドにより変化することが観光地での滞在時間にどのような影響を及ぼすかなどシミュレーションしたかったが, MDCEVモデルのシミュレーションが単純でないことに気づき, 手が回らなかった

We wanted to simulate how changes in tourists' interests due to social trends affect the time spent in tourist destinations, but we realized that the simulation of the MDCEV model was not simple and we did not get to it.

