Customer Analytics

Data collection and RFM & CLV

- Direct Marketing - 1960s
- Data Granularity
- Key Performance Indicators (KPIs)

Recency, **F**requency & **M**onetary Value

- **Recency**
  - Last time someone made a purchase or did some other kind of economically valuable activity
- **Frequency**
  - How many purchases or economically beneficial activities made over a set period of time
- **Monetary Value**
  - Average monetary value

How much will donors give in the future?

How does it depend on their past patterns?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
100001	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
100004	1	0	1	0	1	1	1	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
100008	1	1	1	1	1	1	1	?	?	?	?	?
100009	1	1	1	1	1	1	0	?	?	?	?	?
100010	1	0	0	0	0	0	0	?	?	?	?	?
...												
111102	1	1	1	1	1	1	1	?	?	?	?	?
111103	1	0	1	1	0	1	1	?	?	?	?	?
111104	1	0	0	0	0	0	0	?	?	?	?	?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
100001	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
100004	1	0	1	0	1	1	1	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
100008	1	1	1	1	1	1	1	?	?	?	?	?
100009	1	1	1	1	1	1	0	?	?	?	?	?
100010	1	0	0	0	0	0	0	?	?	?	?	?
...												
111102	1	1	1	1	1	1	1	?	?	?	?	?
111103	1	0	1	1	0	1	1	?	?	?	?	?
111104	1	0	0	0	0	0	0	?	?	?	?	?

How much will donors give in the future?

How does it depend on their past patterns?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
100001	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
100004	1	0	1	0	1	1	1	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
100008	1	1	1	1	1	1	1	?	?	?	?	?
100009	1	1	1	1	1	1	0	?	?	?	?	?
100010	1	0	0	0	0	0	0	?	?	?	?	?
...												
111102	1	1	1	1	1	1	1	?	?	?	?	?
111103	1	0	1	1	0	1	1	?	?	?	?	?
111104	1	0	0	0	0	0	0	?	?	?	?	?

Let's first look at "Bob"

What can we predict about his giving in 2002-2006

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
100001	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
100004	1	0	1	0	1	1	1	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
BOB	**1**	**1**	**1**	**1**	**1**	**1**	**1**	?	?	?	?	?
100009	1	1	1	1	1	1	0	?	?	?	?	?
100010	1	0	0	0	0	0	0	?	?	?	?	?
...												

What can we tell about “Sarah”?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
SARAH	**1**	**0**	**0**	**0**	**0**	**0**	**0**	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
100004	1	0	1	0	1	1	1	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
BOB	1	1	1	1	1	1	1	?	?	?	?	?
...												
111102	1	1	1	1	1	1	1	?	?	?	?	?
111103	1	0	1	1	0	1	1	?	?	?	?	?
111104	1	0	0	0	0	0	0	?	?	?	?	?

How do “Mary” and “Sharmila” compare?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
SARAH	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
MARY	**1**	**0**	**1**	**0**	**1**	**1**	**1**	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
BOB	1	1	1	1	1	1	1	?	?	?	?	?
SHARMILA	**1**	**1**	**1**	**1**	**1**	**1**	**0**	?	?	?	?	?
100010	1	0	0	0	0	0	0	?	?	?	?	?
...												

Which one will be more valuable and by how much?

- If you think that **Mary** is the one who will be more valuable in the future

- If you think that **Sharmila** will be the more valuable one

- Any of you thinks that will be a tie? Any of you thinks that **Mary** and **Sharmila** will be worth pretty much the same?

How do “Mary” and “Sharmila” compare?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
SARAH	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
MARY	**1**	**0**	**1**	**0**	**1**	**1**	**1**	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
BOB	1	1	1	1	1	1	1	?	?	?	?	?
SHARMILA	**1**	**1**	**1**	**1**	**1**	**1**	**0**	?	?	?	?	?
100010	1	0	0	0	0	0	0	?	?	?	?	?
...												

Which one will be more valuable and my how much?

Recency & Frequency

- **What does it mean when there's one or more "no donation" at the end of a sequence?**
  - The donor **lapsed** (i.e., left the donor pool)
  - The donor is **dormant** (i.e., decided not to give that year, didn't think of giving, etc.)
  - We don't know, but can build a model to come up with a "best guess"

Answer: We never know for sure whether the donor is lapsed or not; based on **recency** and **frequency** of their donation, we can make an educated guess about the probability of lapsing, so we can decide where to devote resources

How do “Mary” and “Chris” compare?

ID	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
SARAH	1	0	0	0	0	0	0	?	?	?	?	?
100002	1	0	0	0	0	0	0	?	?	?	?	?
100003	1	0	0	0	0	0	0	?	?	?	?	?
MARY	**1**	**0**	**1**	**0**	**1**	**1**	**1**	?	?	?	?	?
100005	1	0	1	1	1	0	1	?	?	?	?	?
100006	1	1	1	1	0	1	0	?	?	?	?	?
100007	1	1	0	1	0	1	0	?	?	?	?	?
BOB	1	1	1	1	1	1	1	?	?	?	?	?
...												
111102	1	1	1	1	1	1	1	?	?	?	?	?
CHRIS	**1**	**0**	**1**	**1**	**0**	**1**	**1**	?	?	?	?	?
111104	1	0	0	0	0	0	0	?	?	?	?	?

Managerial Questions

- Who are my customers?
- Which customer should I target and spend most of the marketing budget on?
- What's the future value of my customers?

Managerial Questions

- Who are my customers?

Segmentation

- Which customer should I target and spend most of the marketing budget on?

Scoring

- What's the future value of my customers?

Customer Lifetime Value

Segmentation

What managerial goal do I want to achieve?

- **RFM Segmentation**
  - Recency
  - Frequency
  - Monetary Value

Limitations of Statistical Segmentation

- Customers change continuously and modify their behavior
- Involved
- Stability over time

Developing a Managerial Segmentation

- **Simple:**

  Do not create too many segments. If you do, your segmentation will become too complex and hard to use.

- **Relevant:**

  The segments you define need to be relevant to your managers using segmentation.

Goal

Identify, segments or groups of customers, that should receive more or less attention.

Catalogs

Coupons

Emails

Phone calls

Direct mail solicitations

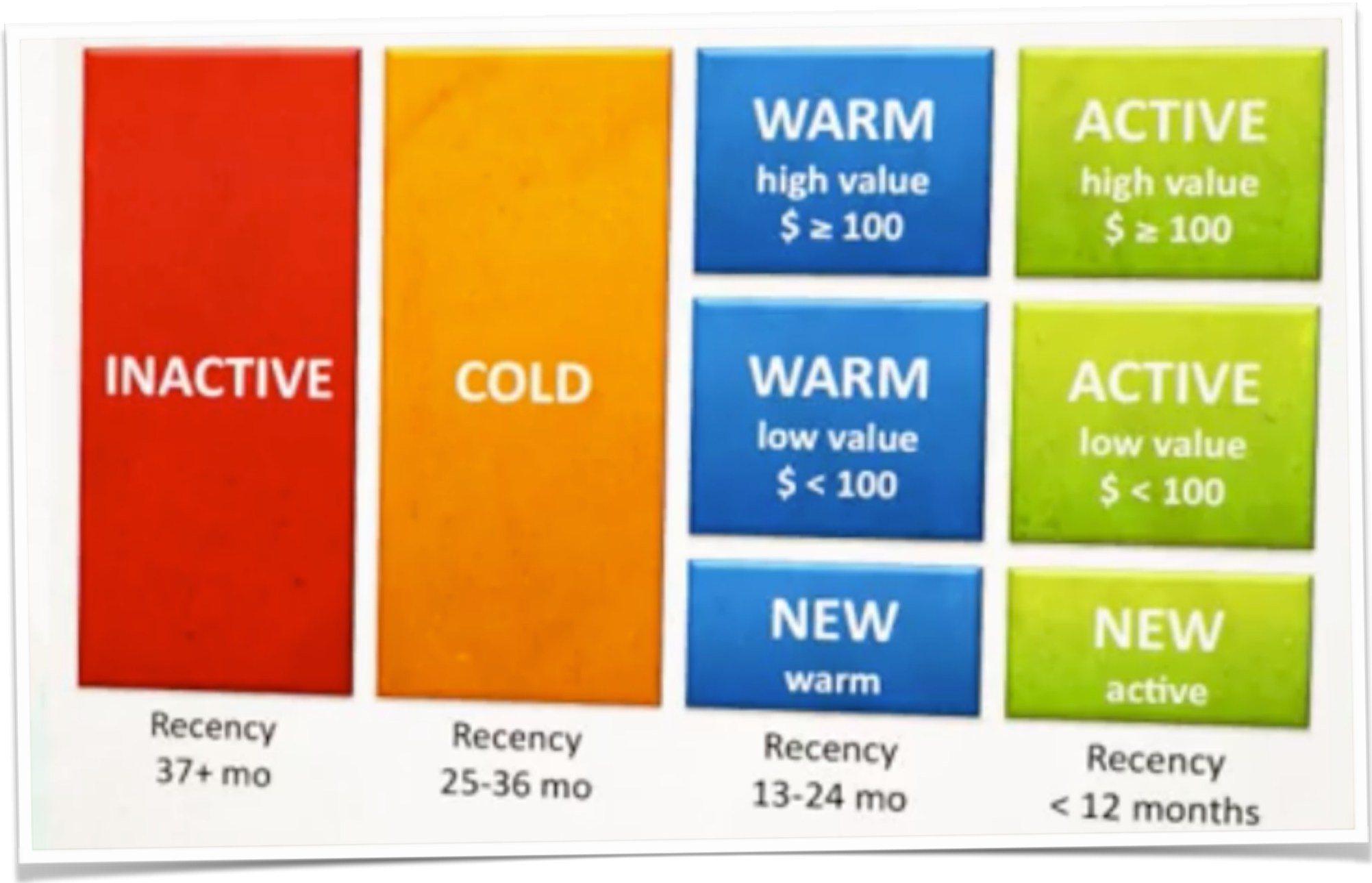
How should we split or segment our database?

Who are my customers?

- How much do they spend?

- How likely they'll buy from us in the future?

Managerial Segmentation


INACTIVE
COLD
WARM
high value
$ ≥ 100
ACTIVE
high value
$ ≥ 100
WARM
low value
$ < 100
ACTIVE
low value
$ < 100
NEW
warm
NEW
active
Recency
37+ mo
Recency
25-36 mo
Recency
13-24 mo
Recency
< 12 months

Describe segments

- **Segment centroid**
- **Segment profile**
- **“Persona”**

  A stereotypical individual who represents the entire segment

Segments & Revenue Generation

- How much does each segment contributes to today's revenues?

- *Forward looking* analysis of revenue generation:

Which segment today would likely contribute to tomorrow's revenues?

- Will your active, high-value customers remain loyal and profitable next year?
- How much revenue will your newly acquired customers generate a year from now?
- Should you expect a lot of revenues from your currently inactive customers or should they be considered lost?

Scoring Model

- Probability that a customer is going to buy something.

- How much money will they spend if they do buy something?

Customer **L**ifetime **V**alue

Why does it matter?

Net present value of all future streams of profits that a customer generates over the life of their business with the company.

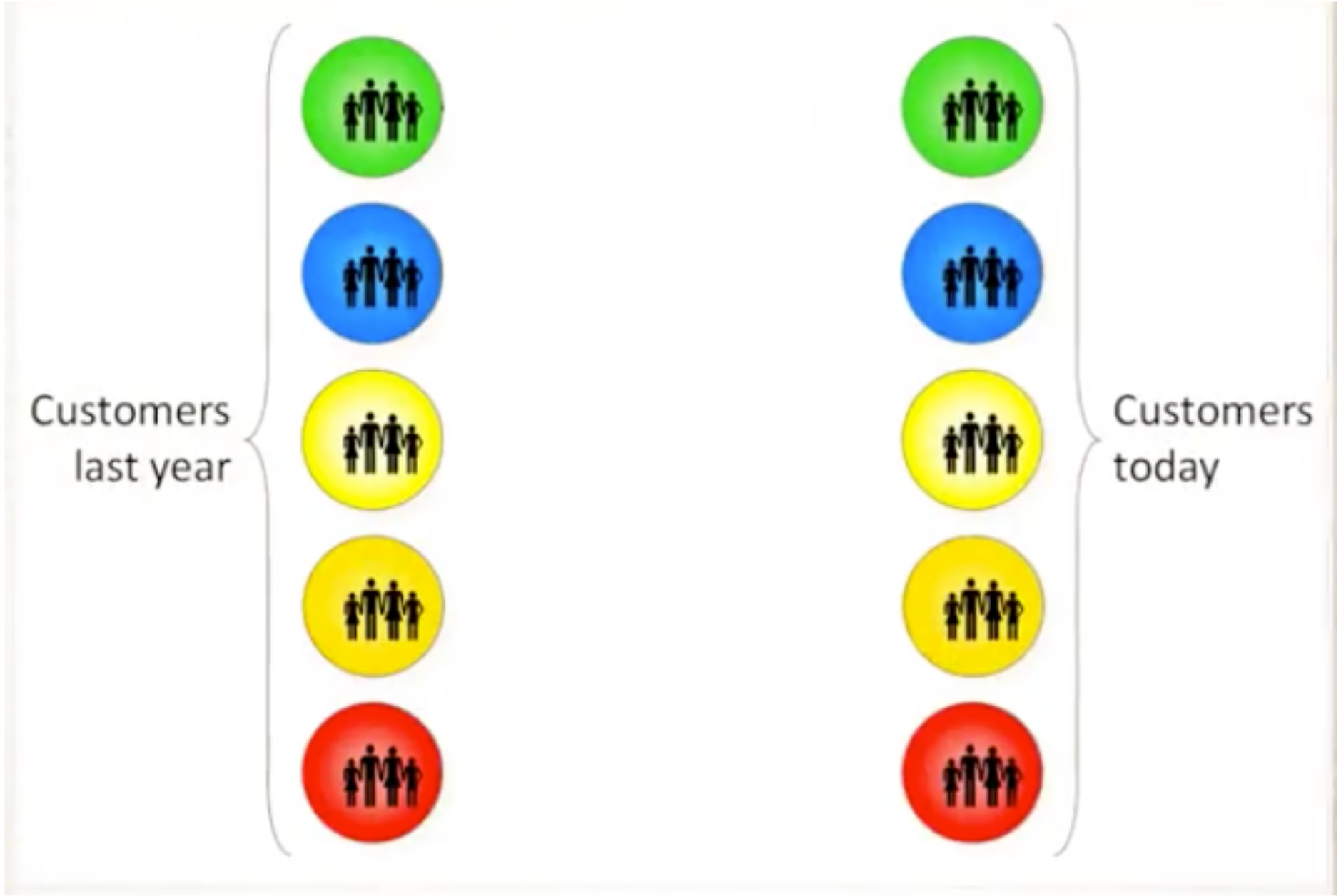
ACTIVE, HIGH VALUE

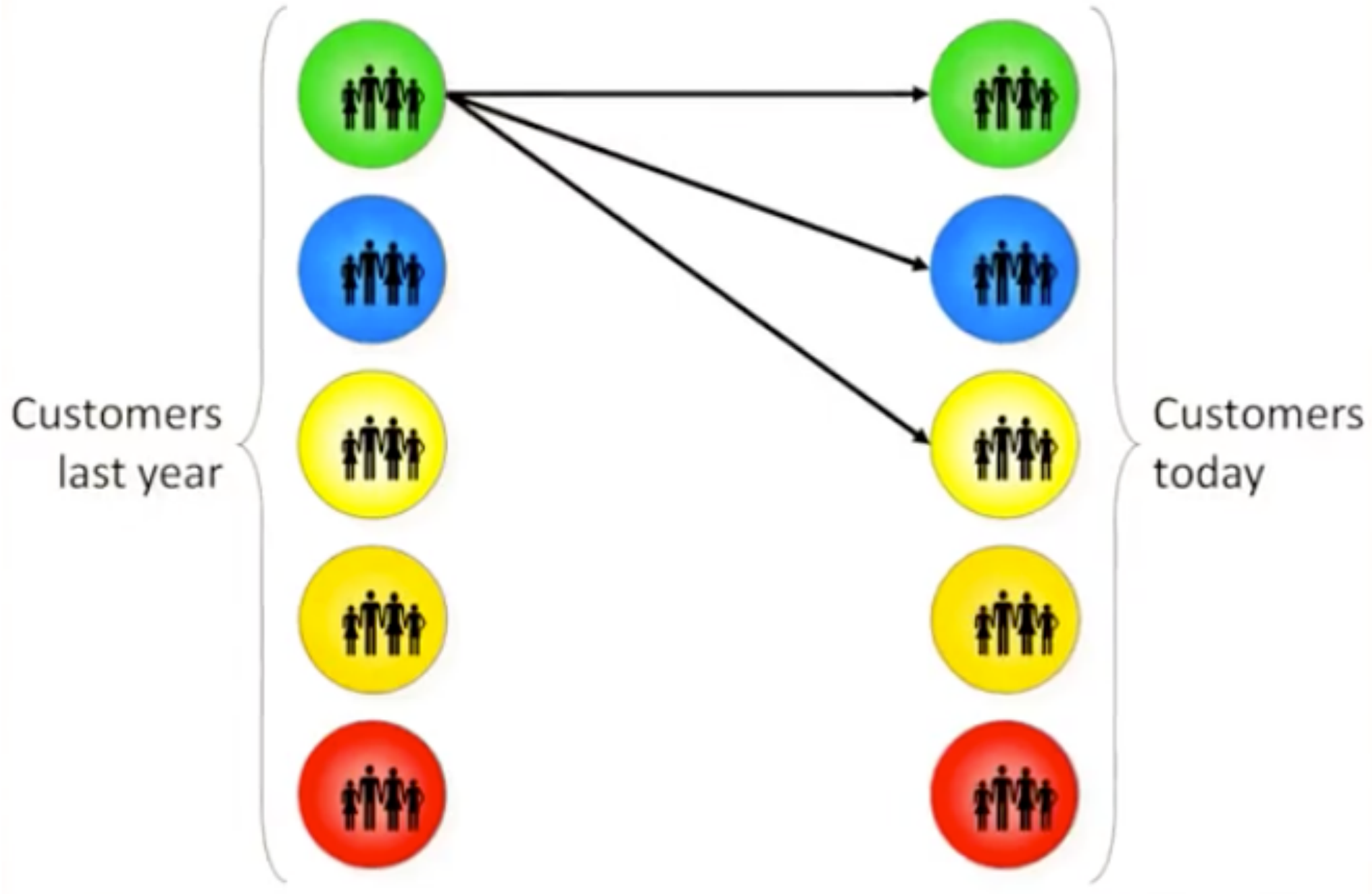
ACTIVE, LOW VALUE

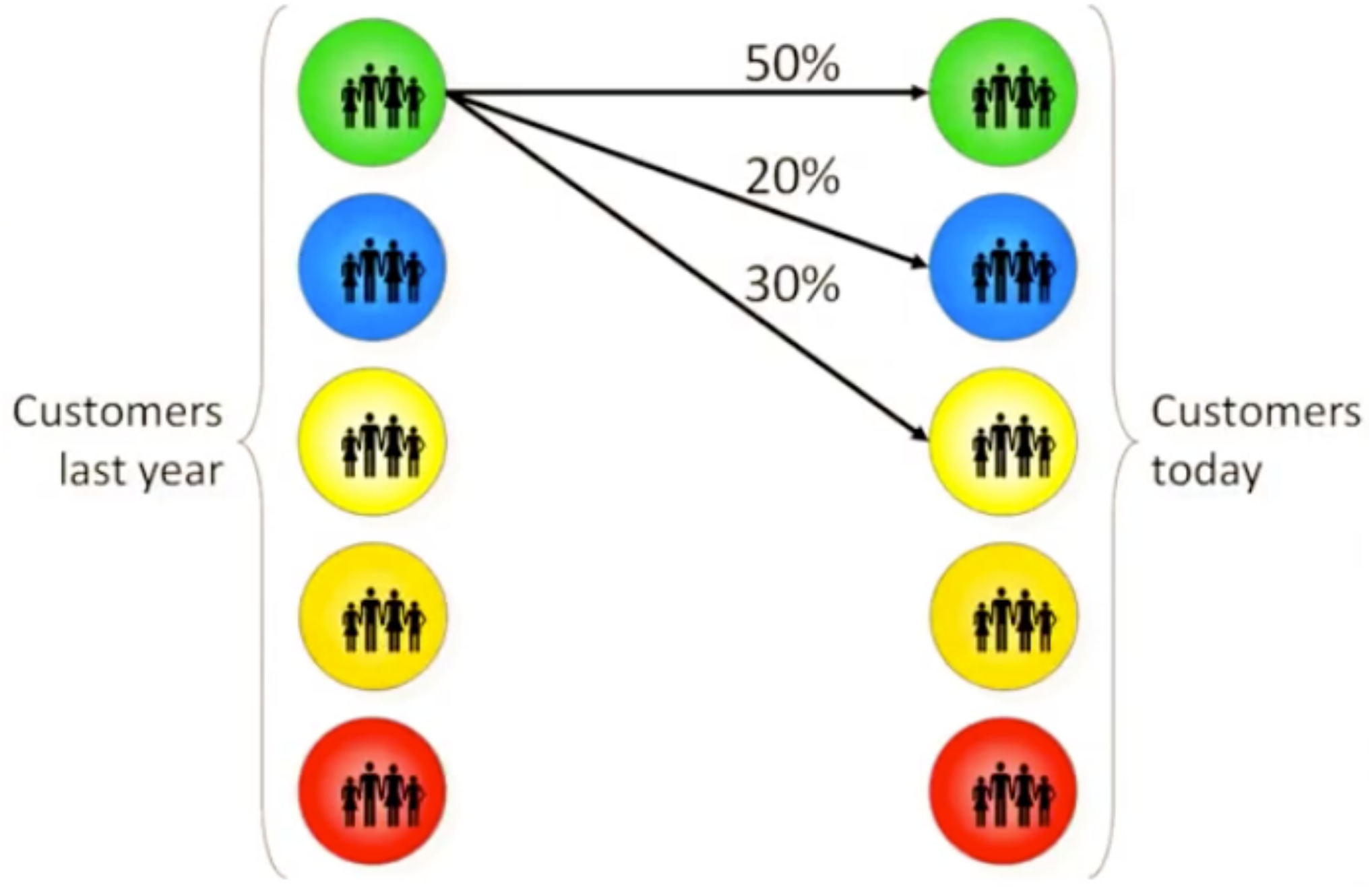
WARM

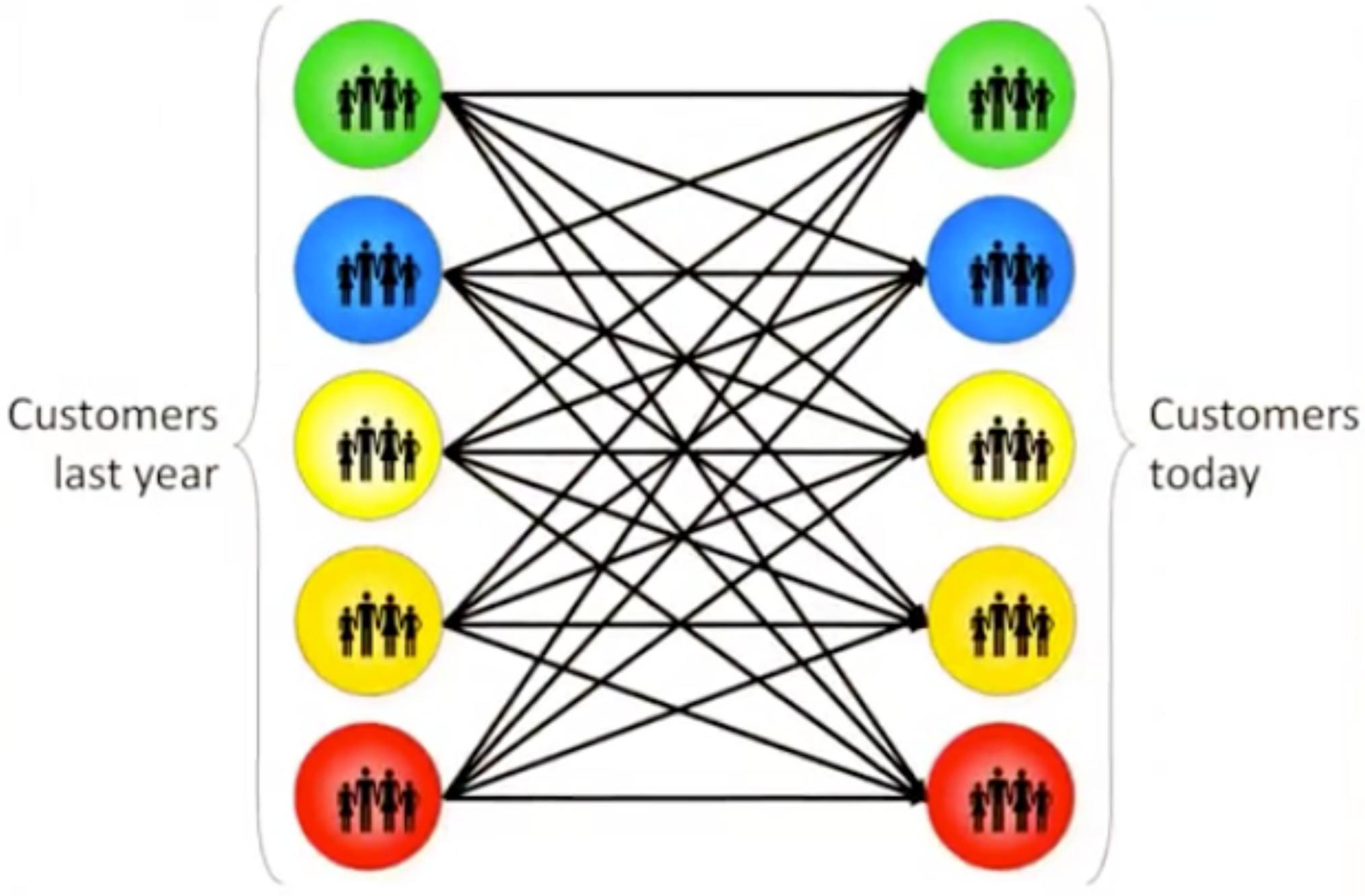
COLD

INACTIVE


Customers last year
Customers today

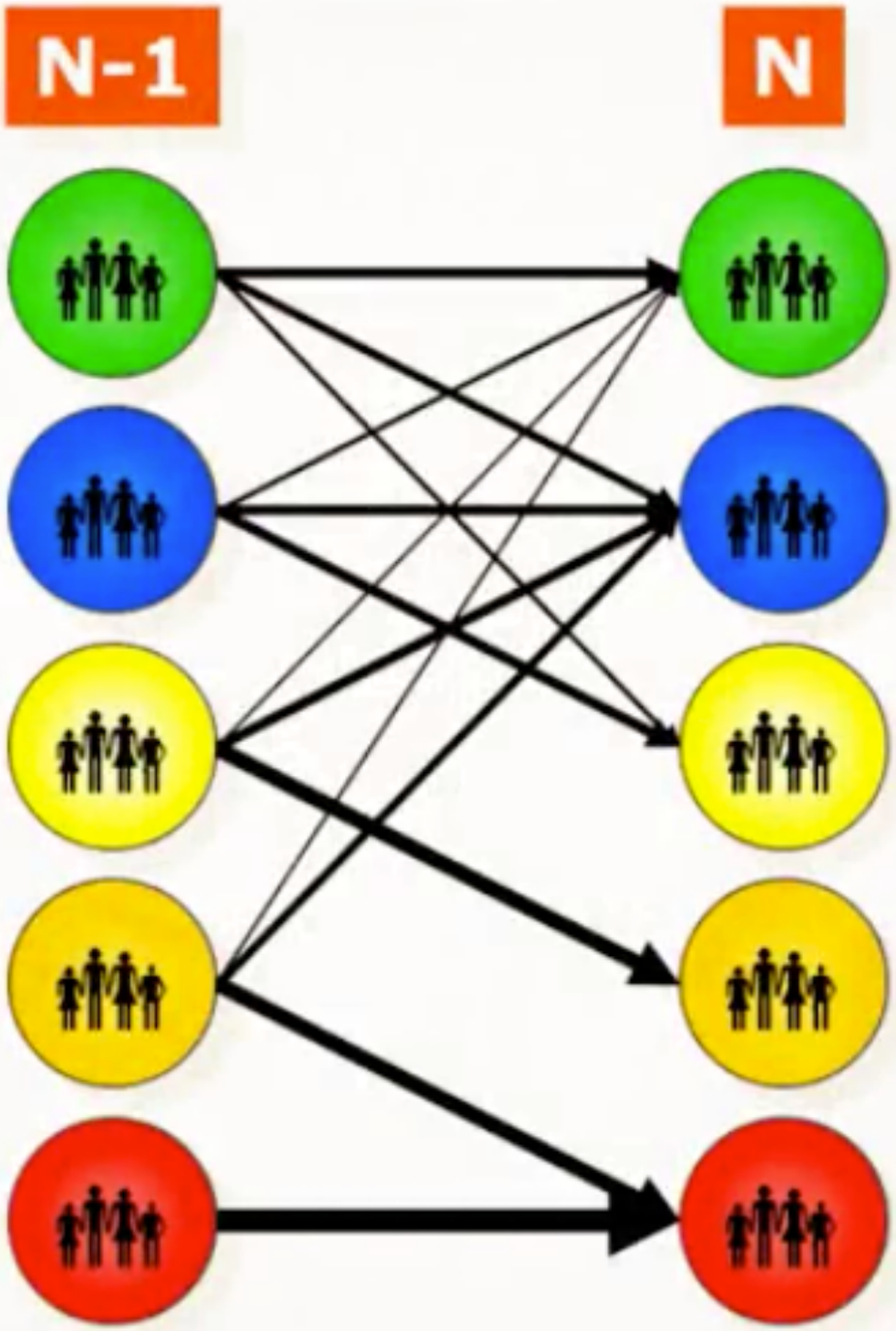

Customers
last year
Customers
today


50%
20%
30%
Customers last year
Customers today


Customers
last year
Customers
today

Transition Matrix

	Active Top	Active Bottom	Warm	Cold	Inactive
Active Top	50%	20%	30%		
Active Bottom	10%	50%	40%		
Warm	5%	25%		70%	
Cold	1%	9%			90%
Inactive					100%



Transition matrix
How many customers you have in each segment to date

Assigning & Discounting revenue

- Revenue generated by a customer can be fully explained and predicted by the segment to which they belong.
- Discount revenues
    - What discount rate?

Customer Lifetime Value

- Average revenue/year per segment (average_revenue)
- Prediction of membership per segment (segment)

Average x Segment

- Compute the sum for each column to obtain yearly revenues
- Don’t forget to discount yearly revenues

Revenue x $1/(1+\text{discount rate})^t$

Data Case

- You can find the data here.
  - Labels: customer_id, purchase_amount, date_of_purchase
  - Discount rate 10%

- Project revenues for the next 10 years.

- What would the database be worth by 2025 (cumulated revenues, discounted)?

- Even # teams (Team 2, Team 4) will present to a technical audience

- Odd # teams (Team 1, Team 3 & Team 5) will present to a non-technical audience.

- Submit your notebook and slides by Thursday, July 13th by 12pm.