

# ShoeFetish.ai

Image-based recommendation engine  
using R, Shiny, and H2O

Neiman Marcus

In stores only

Neiman Marcus

FRIDAY,  
NOVEMBER 26

Spend \$100 or more from  
9 a.m. - 2 p.m. and receive  
a promotional \$50 gift card.\*

Don't be left in the dark.



EXTRA 20% OFF  
REDUCED PRICES

CODE: N/A  
VALID: 11/27-11/29

EXTENDED!

**BLACK FRIDAY EVENT**

INCLUDES ALL FULL-PRICE & SALE ITEMS

**15% OFF**  
ORDERS OF \$250+

**20% OFF**  
ORDERS OF \$500+

**25% OFF**  
ORDERS OF \$1000+

Use code **GOBIG14** at checkout. [SHOP NOW>](#)

[SHOP THE EVENT ON OUR MEN'S SITE, EAST DANE>](#)

Offer valid until Dec. 1, 2014, at 11:59pm PT. Offer cannot be applied to gift certificates, shipping fees, taxes, or gift boxing. See details.

TODAY  
ONLY!

Spend \$100 or more between  
9 a.m. and 2 p.m. and receive  
a \$50 gift card.

Don't be left in the dark.

Some exclusions may apply; see your sales associate for details.

# Neiman Marcus

Average price of a pair of heels is \$946.

Sale of up to 50% off original price (2014)

= still over \$500 (with taxes)



A Christian Louboutin store in Texas averages **\$1108** per transaction.

**Manolo  
Blahnik**

Manolo Blahnik's New York store average spending is **\$963**.



**Capretto**

Miami-based Capretto Shoes has an average transaction of **\$958**.

Jimmy Choo gets **\$889** per transaction at their Vegas store. **JIMMY CHOO**

# ANOUK.

# JIMMY CHOO

Black Laser Cut Suede and Nude Mirror Leather on Mesh Pointy Toe Pumps.

\$995.00



What are my options?

# STYLE & GRACE

## Visual Shoe Dictionary



d'Orsay Pump



Slingback Pump



Stiletto



Wedge Pump



Pump



Platform Pump



Mary Jane



Kitten Heel



Ankle Strap Pump



Peep Toe Pump



T Strap Platform



Gladiator Sandal



Slingback Wedge



Wedge Sandal



Wedge Bootie



Mule



Lita Boot



Hiking Boot



Chelsea Boot



Ankle Bootie



Wingtip



Saddle Shoe



Penny Loafer



Oxford



Boat Shoe



d'Orsay Flat



Thong



Flip-Flop



Ballet Flat



Moccasin



Espadrille



Clog



Slip-On



Sneaker



High-Hop Sneaker

www.STYLEeGRACE.com

# SHOE-OLLOGY



POINTED-TOE  
MARY JANE



POINTED-TOE  
T-STRAP



KITTEN HEEL  
PEEP-TOE D'ORSAY



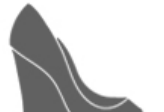
POINTED-TOE  
D'ORSAY



POINTED-TOE  
PUMP



CLOSED-TOE  
WEDGE



PEEP-TOE  
WEDGE



MULE



ALMOND-TOE  
PUMP



ROUND-TOE  
PUMP



PLATFORM  
PUMP



PEEP-TOE  
PLATFORM



POINTED-TOE  
SLINGBACK



PEEP-TOE  
MARY JANE



PEEP-TOE  
SLINGBACK



PEEP-TOE PLATFORM  
SLINGBACK



PEEP-TOE ANKLE STRAP  
PLATFORM



MARY JANE  
PLATFORM



T-STRAP PEEP-TOE  
PLATFORM



T-STRAP PEEP-TOE  
D'ORSAY PLATFORM



PLATFORM  
WEDGE



HEELLESS ANKLE STRAP  
PEEP-TOE PLATFORM



ANKLE STRAP  
PLATFORM



KITTEN HEEL



PEEP-TOE ANKLE STRAP  
PLATFORM WEDGE

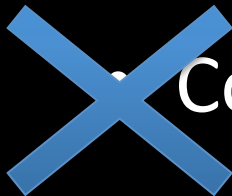
Let's build  
a recommendation engine!



# What model, though?

- Collaborative filtering? : movies
  - -> requires ratings by multiple users
- Association rules? : grocery receipts
  - -> still requires lists or transactions
- Content-based filtering? : Pandora
  - -> needs labeled data, and user profiles

# What model, though?

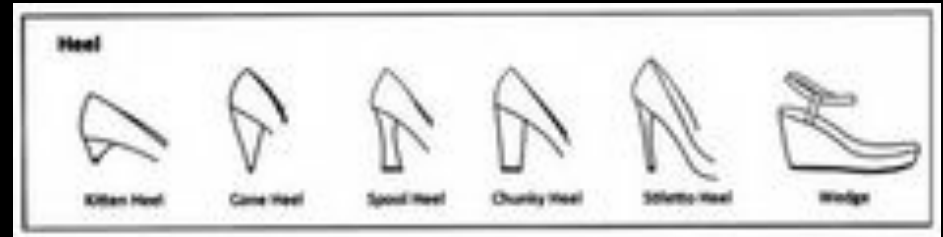
 Collaborative filtering? : movies (although actually hybrid)  
— -> requires ratings by multiple users

 Association rules? : grocery receipts  
— -> still requires lists or transactions

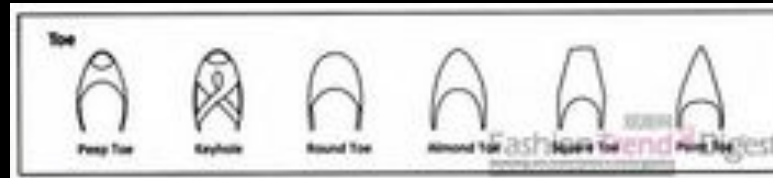
- Content-based filtering? : Pandora
  - -> needs labeled data, and user profiles

# Content based filtering

- Model for
  - heel height and type



- toe type



- style of the shoe

- decorative elements



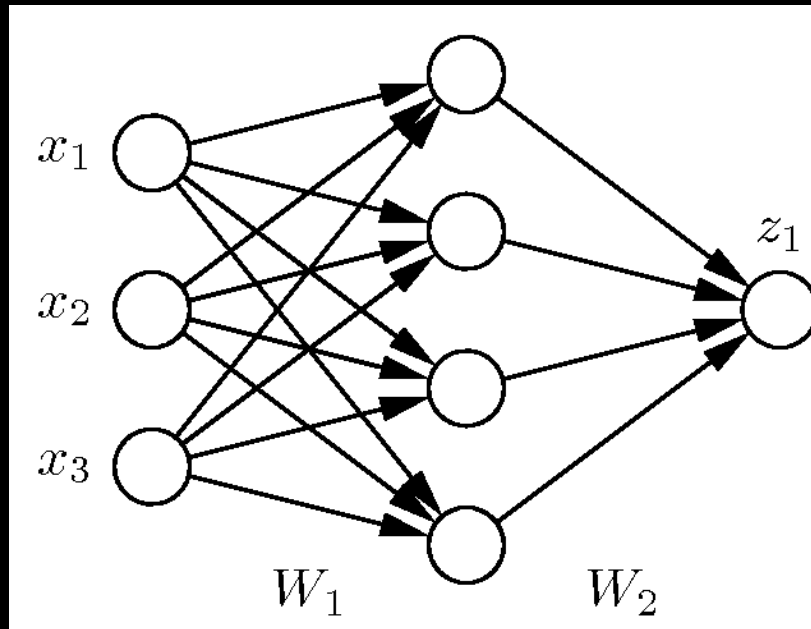
# Content based filtering

Conclusion:

**CONSISTENT LABELS ARE HARD!!!**

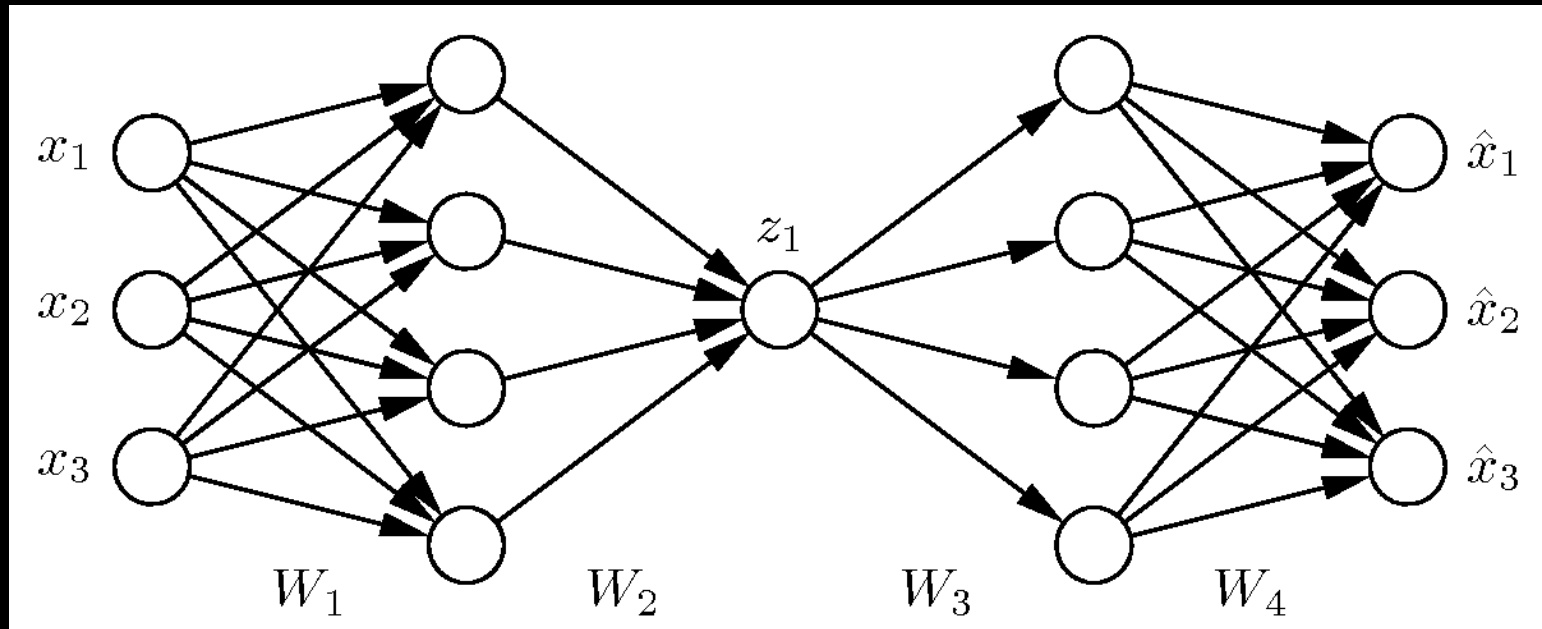
Let's use an autoencoder!

# Autoencoder: Big Picture



Neural net...

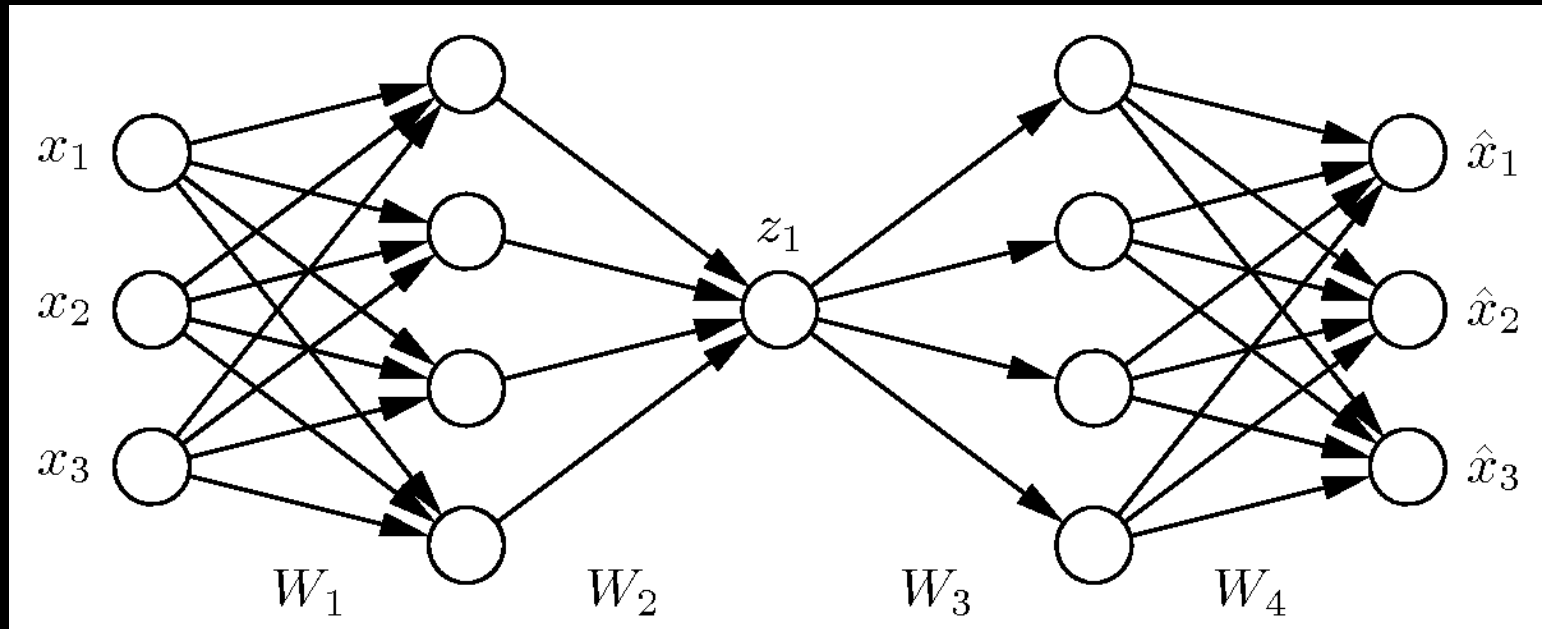
# Autoencoder: Big Picture



Neural net...

...that you then “reverse”

# Autoencoder: Big Picture



Neural net...

...that you then “reverse”

Neural net that takes in inputs, takes them somewhere, then “back to themselves”.



# Model Process:

- From shoe images
  - Find edges, convert to black and white, resize  
(thank you XnConvert!)
  - Read each image, one pixel row at a time,  
into 0-255 value for each pixel

100 x 100 pixel image => 10,000 column vector

# Model Process:

- From the 10k-wide, 350 long matrix
  - Cluster it (k-means clustering)
    - Decided to go with 42 clusters
  - Build autoencoder
    - Model towards cluster labels in 1<sup>st</sup> part
    - Then back out towards inputs, for actual autoencoder
  - Extract layer inside autoencoder, for representation of image that represents image as well as possible

# Recommendation Process:

- Score a new image (Jimmy Choo) through autoencoder
- Compare its extracted layer representation, with extracted layer representation of trained images (DSW shoes)
- Select 5 DSW shoes that are closest to the Jimmy Choo shoe

Demo time

# Resources

Data: <https://github.com/LenaTash/ShoeFetish.ai/tree/master/data>

Quick Overview:

[https://github.com/LenaTash/ShoeFetish.ai/blob/master/Process\\_QuickOverview.txt](https://github.com/LenaTash/ShoeFetish.ai/blob/master/Process_QuickOverview.txt)

Full Tutorial:

[https://github.com/LenaTash/ShoeFetish.ai/blob/master/Tutorial\\_Outline](https://github.com/LenaTash/ShoeFetish.ai/blob/master/Tutorial_Outline)

Email me at [lena.tashkevych@gmail.com](mailto:lena.tashkevych@gmail.com)