

## FIT5186 Intelligent Systems

### Week 9 Tutorial

In “Global Investing: The Game of Risk” (*Wall Street Journal*, June 26, 1997, pp. R1-R18), Greg Ip ranked 52 countries based on their economic performance; on political, economic and market risks; the depth and liquidity of their stock markets; and the regulation and efficiency of their markets. As a result, the countries were classified into five groups:

1. those most similar to the USA;
2. other developed countries;
3. mature and emerging markets;
4. newly emerging markets;
5. frontier markets.

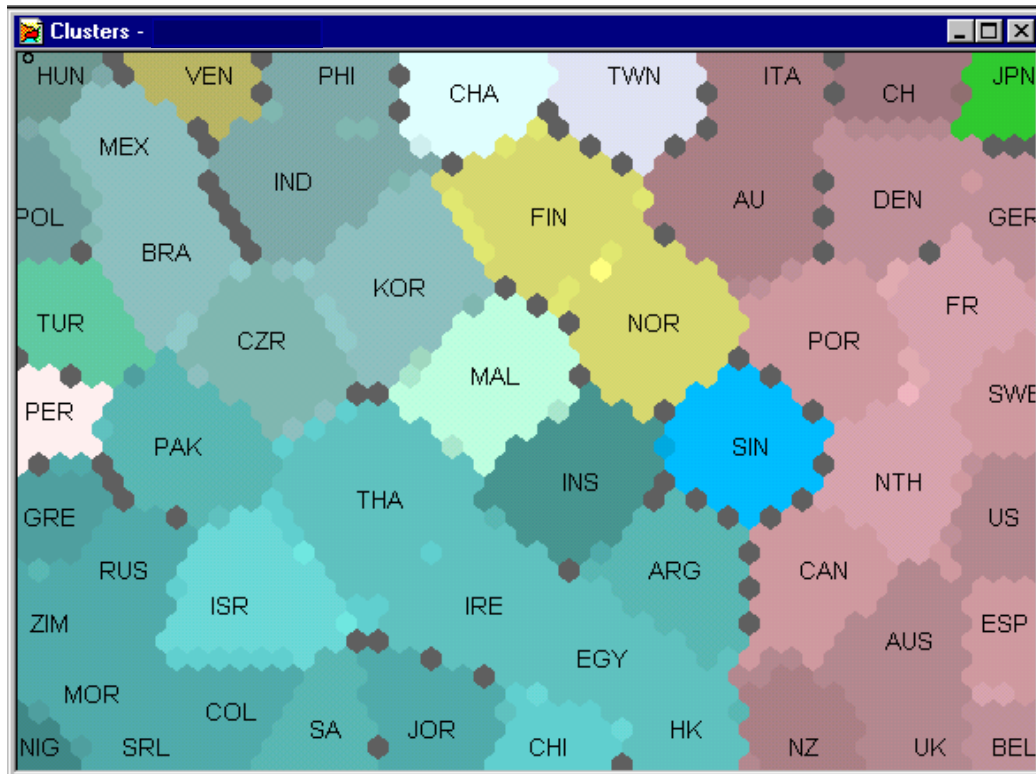
The problem is to verify the country risk analysis presented in the article, to produce a rationale for the grouping of countries, and to provide a visual representation of the data. In this tutorial, we will be using a SOFM to provide a visual representation of the clusters formed by analysing the economic data. The data used for the 52 countries studied are:

1. price earnings ratio forward (as of 1/5/97)
2. dividend yield (as of 17/4/97)
3. projected GDP growth
4. short interest rate (May-June 1997)
5. turnover % (1996 trading volume as % of market capitalisation as of 31/10/96)
6. volatility (five year average of annualised standard deviation as of 3/97)
7. correlation of the markets versus the US market (five year average)
8. safekeeping efficiency (dividend collection, shareholder rights out of possible 100; 1st quarter 1997)

This data is stored in the data file FIT5186W9Tute.xls. An additional column of data records the country code, and will be used for labelling purposes once the SOFM has learned the clusters.

You should use the demo software Viscovery SOMine. Using the File menu, create a new map by selecting the data file FIT5186W9Tute.xls. A window opens to show the input variables (or components) being used. None of these variables have been transformed. Generally, you should transform variables so that their distribution is as *normal* as possible. If you click the pre-processing button you can transform variables using a sigmoid or log transformation. I suggest using a sigmoid transformation on variables 1, 2, 6, 7, and 8, and log transformations on variables 4 and 5. Close the preprocessing window, and click the next button. Leave all of the default values for the target map window, and keep clicking the next button and finally the finish button. The SOFM will begin training.

The map created will be an initial set of clusters designed to be as distinct as possible. By experimenting with the cluster threshold value, you should be able to produce a map like the one below (with a cluster threshold of 23):



From the Analyze menu, choose the Tune option. Try a cluster threshold of around 20. If the cluster threshold is large, then few clusters will be created since countries do not have to be too similar to be placed in the same cluster. If the cluster threshold is reduced, then the SOFM becomes more discriminating, and more clusters are created.

The names of the countries can be attached to the clusters they are represented by, using the Edit menu. First, re-open the data file FIT5186W9Tute.xls using Excel, and copy the data (including the column headings) using ctrl+c. Then, return to the SOFM map, choose Label mode from the Edit menu, then Paste Labels from the Edit menu.

If you take into account all of the data, and perform appropriate transformations, the data will self-organise into quite different groups than if you visually impose five groups of approximately the small size, and use the USA as a benchmark. The Wall Street Journal article classification of each country is shown on the next page.

The SOFM map provides a clear data-driven breakdown of the structures in the data, and allows us to assess the validity of the Wall Street Journal analysis of country credit risk groupings.

Group 1

1	US
1	AUS
1	CAN
1	DEN
1	FR
1	GER
1	IRE
1	NTH
1	NZ
1	SWE
1	CH
1	UK

Group 2

2	AU
2	BEL
2	FIN
2	HK
2	ITA
2	JPN
2	NOR
2	SIN
2	ESP

Group 3

3	ARG
3	BRA
3	CHI
3	GRE
3	KOR
3	MAL
3	MEX
3	PHI
3	POR
3	SA
3	THA

Group 4

4	CHA
4	COL
4	CZR
4	HUN
4	IND
4	INS
4	ISR
4	POL
4	SRL
4	TWN
4	VEN

Group 5

5	EGY
5	JOR
5	MOR
5	NIG
5	PAK
5	PER
5	RUS
5	TUR
5	ZIM